



LOAD FORECAST

**Economics &
Forecasts Division**

Power System Program Branch

No. 871214

88-04233/

LOAD FORECASTS REPORT

NO. 871214

SYSTEM DEMANDS

Load Forecasts Department
Economics and Forecasts Division
Power System Program Branch

May 1988

TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	i
1.0 SHORT-TERM FORECAST - 1987 TO 1992	1
1.1 Highlights	1
1.1.1 Short-Term Forecast	1
1.1.2 Comparison with Load Forecast 861208 - Peak Demand	2
1.1.3 Comparison with Load Forecast 861208 - Energy Demand	3
1.1.4 Comparison of Primary to Basic: Load Forecast 871214	4
1.1.5 Regional Estimates	4
1.2 Commentary	5
1.2.1 Considerations Affecting the Revised 1987 Short-Term Forecast	5
1.2.2 Short-Term Forecasting Models	6
1.2.3 The Unallocated Load	7
1.3 Losses	7
1.4 Capacity Interruptible Loads	8
1.5 Performance of Load Forecast 861208 in 1987	8
1.5.1 Actual Primary Demand Versus Forecast 861208	8
1.5.2 Weather-Corrected Primary Demand Versus Forecast 861208	10
2.0 LONG-TERM FORECAST - 1993 TO 2010	11
2.1 Highlights	11
2.1.1 Load Forecast 871214	11
2.1.2 Comparison with Load Forecast 861208 - Peak Demand	12
2.1.3 Comparison with Load Forecast 861208 - Energy Demand	13
2.1.4 Comparison of Basic Load Forecast 861208 to Basic Load Forecast 871214	14
2.1.5 Forecast Uncertainty	14
2.2 Commentary	15
2.2.1 Methodology of the Long-Term Basic Load Forecast	15
2.2.2 Discussion of Major Assumptions	16
2.2.3 Risks to the Forecast	18
2.3 Results of Forecasting Models	19
2.3.1 Economic and Demographic Energy Model - EDEM	19
2.3.2 End-Use Model Forecast	24
2.3.3 Recommended Forecast	32
2.4 Results for Alternative Scenarios	34
2.5 Impact of Ontario Hydro's Marketing Activities	36
2.5.1 Introduction	36
2.5.2 The Forecast	37
2.5.3 Policy Assumptions Embedded in the Forecast	38

TABLE OF CONTENTS (continued)

	<u>Page</u>
3.0 PERFORMANCE OF LOAD FORECAST 871214 IN 1987	73
3.1 Actual Primary Demand Versus Forecast	73
3.2 Weather-Corrected Primary Demand Versus Forecast	73
3.3 Diversity and Losses	74
3.4 Unallocated Load	75
3.5 Detail of Customer Loads	76
4.0 UNCERTAINTY IN THE LOAD FORECAST	87
5.0 GLOSSARY	91
5.1 Demand (versus Load)	91
5.1.1 Basic Load Forecast	93
5.1.2 Primary Load Forecast	93
5.2 Diversity and Losses	93
5.3 Customers' Loads	93
5.3.1 Firm Loads	94
5.3.2 Capacity Interruptible Loads	94
5.4 Standby Power	95

INTRODUCTION

The Load Forecasts Department normally issues two load forecasts each year: a Long-Term Forecast, produced in the fall for system planning purposes; and a Short-Term Forecast, produced in early summer for revenue planning, rate development and budget purposes. The Long-Term Forecast has a time horizon of approximately 20 years.

The unexpected increase in demand for electricity in 1987, combined with the decision to implement the OEB's recommendation on the Load Forecast in H.R. 16, led to a revision of the 1987 Short-Term Forecast in October. This Load Forecast Report contains the revised Short-Term Load Forecast as well as the Long-Term Forecast which was approved by the Board of Directors on December 14, 1987.

The revised Short-Term Load Forecast for the period 1987-1992 is presented first. It was prepared using the results of:

- A customer survey carried out in the spring (called Regional Estimates);
- The updated economic forecasts based on the latest trends and anticipated changes in the economic environment;
- Electricity demand forecast models relying on the most recent data;
- The latest analysis of the deviations of recent Ontario electricity demands from last year's predictions;
- A revised forecast of Indirect Incentives.

The Short-Term Primary Load Forecast section includes a comparison of the Primary Load Forecast with last year's Primary Load Forecast and this year's Basic Load Forecast, a discussion of Indirect Incentives, and a summary of the Regional Estimates. Also provided is a brief commentary on considerations affecting the forecast, such as the economic outlook, future electricity price levels, weather effects, and the amount of electricity attributed to unallocated load and transmission losses. With the exception of unallocated load, all these factors contribute to the uncertainty associated with the forecast. The uncertainty with respect to the Short-Term Forecast is covered along with the Long-Term Forecast in Section 2.1.5. Analysis of the performance of last year's forecast, a description of the short-term forecasting models we use and the forecast of capacity interruptible loads complete the section on the short-term forecast.

The Long-Term Load Forecast for the years 1993-2010 was derived taking into account several inputs: the short-term forecast, the long-term economic outlook, econometric model (EDEM) estimates, end-use model estimates, the 1986 Load Forecast, judgmental factors, and the Indirect Incentives forecast.

The presentation of the Long-Term Primary Load Forecast is similar to that for the Short-Term. The chapter includes the results of two different approaches to forecasting, the econometric (EDEM) and end-use models, as well as two approaches to describing forecast uncertainty, a statistical confidence interval based on historical forecast performance and alternative load growth scenarios generated by the EDEM model using alternative macroeconomic scenarios.

Since 1986, an amount has been subtracted from the Short- and Long-Term Basic Load Forecasts to show the forecasted effects of Indirect Incentives on total system demand. The resulting forecast is the Primary Load Forecast. All notation and tables presented in this report refer to the Primary Load Forecast unless the Basic is explicitly noted. The Primary Load Forecast has the same role in the planning process as it always has: it is the most-likely projection of the load Ontario Hydro must plan to supply (after directly controlled loads have been netted out).

The Indirect Incentives forecast is the estimated net impact of Marketing programs initiated by Ontario Hydro which use financial incentives to alter the level and the shape of the load. It is forecasted that these incentives will reduce energy demand by 8.1 TW.h in the year 2010, resulting in a Primary Load Forecast of 201.4 TW.h, compared with the Basic level of 209.5 TW.h.

Supplementary reports have been prepared which provide additional detail: individual customers' monthly energy for the period 1987 - 1992 and an aggregation of load for all customer classes within areas, projected to the year 2010. These reports are not printed for wide distribution because they are of limited interest to most readers. They are available in machine-readable form for users who require the data.

1.0 SHORT-TERM FORECAST - 1987 to 1992

1.1 Highlights

The 1987 Short-Term Forecast presented to the Executive Office in August 1987 was changed from the 1986 Short-Term Forecast. The peak forecast was .5% lower, on average, in each year and the energy forecast was .4% lower, on average, for the first three years and .3% higher, on average, for the remainder of the forecast period.

The OEB's Report on H.R. 16, Recommendation 4, called for an increase in the 1986 Load Forecast for 1988 by 0.5%. This was approved by the Executive Office in October 1987 for both the 1988 rate finalization and the preparation of the 1988 Budget. The decision to accept the OEB's recommendation reflected a number of considerations. For the first ten months of 1987, actual average peak demand was 2.4% higher than the level in the 1987 Short-Term Forecast and energy was higher by 1.5%. Although the hot humid summer weather contributed to part of this deviation, the higher than expected economic growth in 1987 was a major contributor. The 1987 Short-Term Forecast for 1987 was based on an economic growth forecast of 2.9%. Estimates made in September for 1987 predicted a growth of approximately 3.5%. The updated Short-Term Forecast is consistent with the September, 1987 Economic Outlook.

Since the preparation of the 1987 Short-Term Forecast in early summer, a revised estimate of the Indirect Incentives was prepared based on Marketing's approved Business Plan. The revised 1987 Short-Term Forecast incorporates these new estimates.

1.1.1 Short-Term Forecast

The 1987 Short-Term Primary Load Forecast for the total system is:

Table 1.1.1: Total System Demand

Year	December 1-Hour Peak			Energy					
	MW	Annual Growth		Avg MW	TW.h	Annual Growth			
		MW	%			Avg MW	%	TW.h	%
Short Term									
1986 Actual	20536			13764	120.6				
1987	21314	778	3.8	14297	125.2	533	3.9	4.7	3.9
1988	22060	746	3.5	14768	129.7*	471	3.3	4.5*	3.6*
1989	22685	625	2.8	15210	133.2	442	3.0	3.5	2.7
1990	23271	586	2.6	15638	137.0	428	2.8	3.8	2.8
1991	23752	481	2.1	16037	140.5	399	2.6	3.5	2.6
1992	24225	473	2.0	16423	144.3*	386	2.4	3.8*	2.7*
Avg Increase									
1986-1992		615	2.8			443	3.0	4.0	3.0
1987-1992		582	2.6			425	2.8	3.8	2.9

* Affected by Leap Year

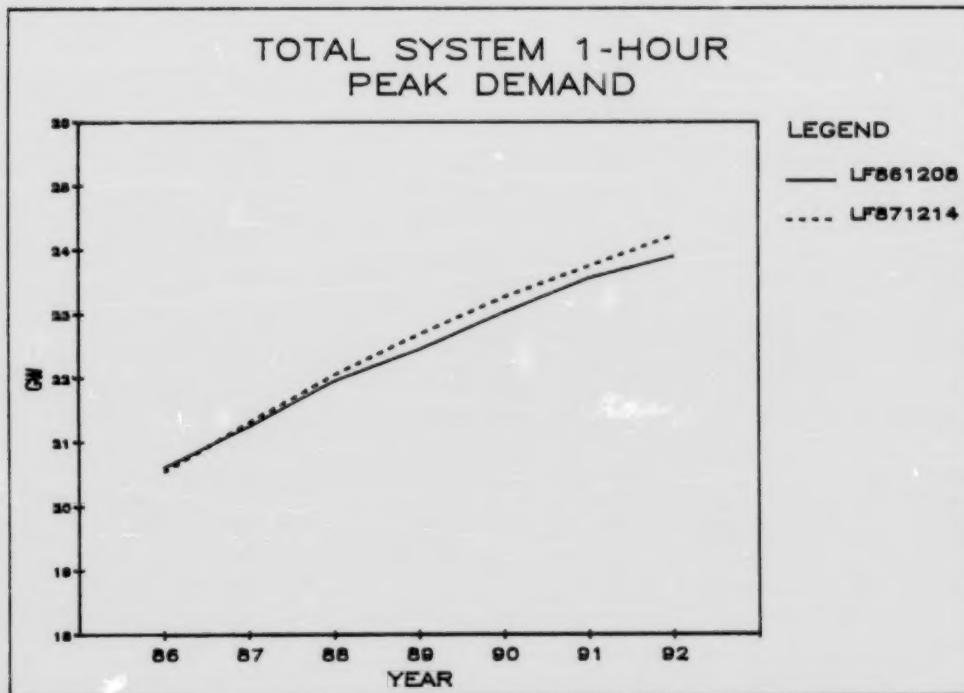
1.1.2 Comparison with Load Forecast 861208 - Peak Demand

The level of the peak forecast over the whole forecast period is 0.8% higher on average than the 1986 Short-Term Forecast.

Table 1.1.2: 1-Hour Peak Demand

	Primary Load Forecast 871214		Change from Primary Load Forecast 861208		Primary Load Forecast 861208	
	Peak MW	% Inc	MW	%	MW	% Inc
December						
1986	20536*				20610	
1987	21314	3.8	58	0.3	21256	3.1
1988	22060	3.5	98	0.5	21962	3.3
1989	22685	2.8	234	1.0	22451	2.2
1990	23271	2.6	240	1.0	23031	2.6
1991	23752	2.1	188	0.8	23564	2.3
1992	24225	2.0	322	1.4	23903	1.4
Avg % Inc						
1986-1992		2.8				2.5
1987-1992		2.6				2.4

*Actual



1.1.3 Comparison with Load Forecast 861208 - Energy Demand

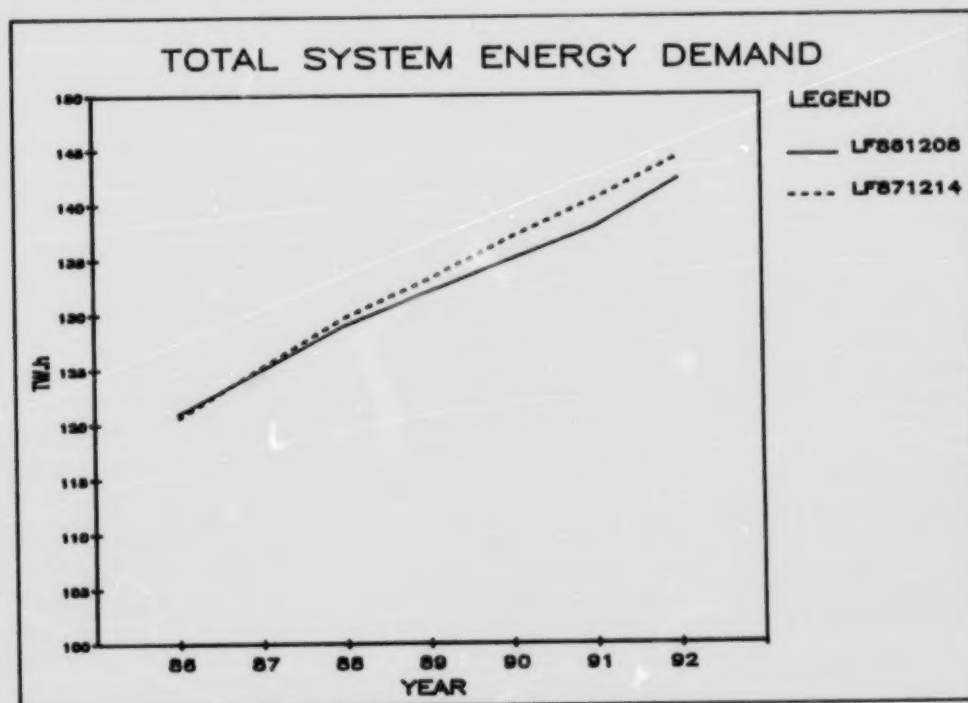
The level of the energy forecast is 1% higher on average than the 1986 Short-Term Forecast for the period 1987 to 1992.

Table 1.1.3: Energy Demand

Year	Primary Load Forecast 871214			Change from Primary Load Forecast 861208		Primary Load Forecast 861208		
	Avg MW	TW.h	% Inc TW.h	TW.h	%	Avg MW	TW.h	% Inc TW.h
1986	13764*	120.6*				13810	121.0	
1987	14297	125.2	3.9	0.2	0.2	14274	125.0	3.4
1988	14768	129.7**	3.6**	0.7	0.5	14690	129.0**	3.2**
1989	15210	133.2	2.7	1.1	0.9	15079	132.1	2.4
1990	15638	137.0	2.8	2.0	1.5	15413	135.0	2.2
1991	16037	140.5	2.6	2.6	1.9	15738	137.9	2.1
1992	16423	144.3**	2.7**	1.9	1.3	16250	142.3**	3.3**
Avg % Inc								
1986-1992			3.0					
1987-1992			2.9					
							2.8	2.6

* Actual

** Affected by Leap Year



1.1.4 Comparison of Primary to Basic: Load Forecast 871214

Again this year, there is a differentiation between business-as-usual system demand and that which will result after various market interventions by Ontario Hydro. Formerly the Load Forecast did not specifically include the results of these marketing efforts. The following table lists the two components of the Short-Term Load Forecast: the Basic Load Forecast, derived as in previous years, which includes the effects on demand of Ontario Hydro's research, education and promotion; and the Primary Load Forecast, produced by subtracting from the Basic Load Forecast the net estimated impact of the financial incentives expected to be offered to our customers to modify their peak and energy demands.

The forecast of Primary Load includes net reductions due to Hydro customers' response to:

- (1) changes in rate structure such as time-of-use rates, off-peak incentives, blended power rates, etc.;
- (2) financial incentives such as grants or loans, etc.

The Primary Peak Load Forecast figures have been calculated by subtracting the December peak power reductions established for future years from the Basic Load Forecast peak demands.

Table 1.1.4: Load Forecast 871214 - Primary vs Basic

Year	December Peak - MW				Energy - GW.h			
	Basic	Indirect Incent.*	Primary	% Diff.	Basic	Indirect Incent.	Primary	% Diff.
1986 Actual	20536	0	20536	0.0	120574	0	120574	0.0
1987	21314	0	21314	0.0	125240	0	125240	0.0
1988	22061	1	22060	0.0	129724	5	129719	0.0
1989	22770	85	22685	0.4	133264	27	133237	0.0
1990	23443	172	23271	0.7	137053	64	136989	0.0
1991	24017	265	23752	1.1	140620	134	140486	0.1
1992	24680	455	24225	1.8	144528	271	144257	0.2
Avg. % Inc.								
1986-1992	3.1		2.8		3.1		3.0	
1987-1992	3.0		2.6		2.9		2.9	

* A breakdown of indirect incentives by efficiency improvement programs and time-of-use rates is available in section 2.5.2.

1.1.5 Regional Estimates

To initiate the short-term forecasting process, the Load Forecasts Department asks the regional offices to provide six years of estimates of the peak for each wholesale customer (municipalities and direct industrial) and total retail customers. The regional staff, using the results from a time-series model provided by the Load Forecasts Department, together with their knowledge of the local economy and consultation with large customers, prepare an estimate for each month of the current year and the first forecast year. For the subsequent four years, only December forecasts are made.

The customers are canvassed each spring for forecasts of their own peak demands. Their estimates, which underlay the August 1987 Short-Term Forecast, were about 1% lower than the similar estimates done for the 1986 Short-Term Forecast throughout the forecast period.

Table 1.1.5: Sum of Customers' Loads - MW

<u>Average Monthly 1-Hour Non-Coincident Peaks</u>				
<u>Year</u>	<u>1987 Customer Survey</u>	<u>1986 Customer Survey</u>	<u>Differences</u>	<u>% Change</u>
1987	18879	19058	-179	-0.9
1988	19599	19777	-178	-0.9
1989	20363	20548	-185	-0.9
1990	21078	21281	-203	-1.0
1991	21811	22014	-203	-0.9
1992	22492	N/A	N/A	

The municipal utilities, the area offices, and the direct customers have the best and most detailed information about plans in their own neighbourhoods and businesses. They have the best perspective on new developments requiring electricity, on local business anomalies and on the continuity of existing sales. Their estimates are believed to be quite reliable for the near term. At the time of the August 1987 forecast, the 1987 customer estimates were in line with Load Forecasts' expectations for growth throughout the Province.

1.2 Commentary

1.2.1 Considerations Affecting the Revised 1987 Short-Term Forecast

In addition to the Regional Estimates, a number of factors influence the forecast of the level of peak and energy, such as forecasts of the economy and energy prices. The outlook for these factors at the time the Short-Term Forecast was updated in fall 1987 is discussed below.

(1) Economic Outlook

During the early months of 1987, Canadian economic growth was much more buoyant than most forecasters had predicted. Residential construction and expenditures for capital machinery and equipment were incredibly strong, corporate profits were dramatically higher and exports firmed. Even consumer spending, the backbone of the post-1982 recovery, continued to offer an important stimulus to the economy. In Ontario, the economic news was even more spectacular. Provincial gains exceeded the national average by more than two percentage points. Even so, the recovery is very definitely slackening off. Growth in the service sector, the primary source of growth in 1986, has peaked. Residential construction is also likely to retreat in coming months paralleling the sizable contraction in real estate activity. The downstream effects on consumer spending and related manufacturing production will be significant and when combined with the already substantial effects of declining North American auto sales will be enough to reduce provincial economic growth from 5% in 1986 to only 3.5% in 1987 and further to 2.9% in 1988.

The following table shows the Economics and Forecasts Division's Canadian and Ontario output projections.

Table 1.2.1: Economics and Forecasts Division's Outlook

Gross Product - \$1971 Billion								
Year	Canada				Ontario			
	1986 May	% Increase	1987 Sept.	% Increase	1986 May	% Increase	1987 Sept.	% Increase
1986	152.6	3.5	170.5	3.3	61.5	4.2	61.7	5.0
1987	157.2	3.0	175.4	2.9	63.6	3.4	63.9	3.5
1988	161.9	3.0	180.2	2.7	65.7	3.3	65.7	2.9
1989	166.7	3.0	185.6	3.0	67.7	3.0	67.8	3.2
1990	171.8	3.0	191.2	3.0	69.7	3.0	69.7	2.8
1991	176.9	3.0	196.9	3.0	71.8	3.0	72.2	3.6

(2) Electricity Price Levels

Real electricity prices are projected to remain almost constant in real terms in 1988, and decline slightly in 1989. Electricity's price competitiveness relative to both fuel oil and natural gas deteriorated in recent years - especially in the 1986/1987 period when weak crude oil prices and deregulation of the natural gas market resulted in lower retail prices for both fuels in Ontario. Little change in electricity's relative price is projected for 1989.

(3) Weather

The expanded Short-Term Forecast includes monthly forecasts of energy and peak demand. The monthly actual demands, as well as the annual actual totals, are strongly influenced by weather conditions. For the purpose of the forecast, normal weather conditions, as measured by the recorded averages, are assumed. For example, the December peak is assumed to occur on the most extreme weather day in December, which is assumed to have temperature, wind and illumination conditions equal to the typical extreme day in December.

1.2.2 Short-Term Forecasting Models

For several years the Load Forecasts Department has been gaining experience with several more advanced forecast modelling techniques. These use monthly data and comprise the single and multiple variable time series methods as well as a regression technique that focuses on modelling patterns in the remaining error terms.

These methodologies have been known for many years but have only recently become mature enough to provide forecasts for the short term. The Electric Power Research Institute in the United States has spearheaded the effort to make these methods readily available in a form suited to electric utility use.

The single variable time series model, called the Box-Jenkins technique after the original developers, presumes that all information suited to set up the model is contained within the data history of the series to be predicted. Further elaborations of this modelling system employ a small number of related variables (related in a cause and effect manner), in addition to the series to be predicted in estimating a forecasting model. These are called State-Space or Multivariate (Vector) Transfer Function methods.

The regression modelling scheme sets up a single equation to produce monthly predictions. The biases in the estimation of the model's coefficients introduced by the autocorrelation of the variables over such short time periods are minimized by refinements to the equation which add functions of lagged data.

Rigorous mathematics can be employed to produce statistical confidence intervals around the forecasts and to make many figures of merit available from the various formulations of the above models. These are used to tune and perfect the models, and help in making judgements about the weight to give to these predictions in arriving at the final forecast.

1.2.3 The Unallocated Load

The customer surveys form an important part of the data used in generating the forecast, but they are only one part of the comprehensive information incorporated in the Basic Load Forecast. All available indicators of economic performance and electricity sales are considered, as well as the results of the short-term models described above. The forecast will probably reflect more than one approach and the implicit weights tend to vary in each year of the forecast period in consideration of the relative forecast performance of each methodology for that time horizon. To reconcile the total of the customer estimates to the Basic Load Forecast, an amount may be added or subtracted. This amount is called unallocated load.

Table 1.2.3: Sum of Customers' Loads - MW

Year	Customer Survey	<u>Average Monthly 1-Hour Peaks</u>	
		<u>Unallocated Load</u>	<u>1987 Short-Term Load Forecast</u>
1987	18879	+18	18897
1988	19599	-58	19541
1989	20363	-215	20148
1990	21078	-341	20737
1991	21811	-463	21348
1992	22492	-575	21917

The amounts of unallocated load shown in the table are less negative than those used in last year's report.

1.3 Losses

In addition to estimates of customer demand, transmission losses are incorporated in the Basic Load Forecast. These losses averaged approximately 4.0% of customer energy for the period 1981 to 1983. Since 1984 losses have been gradually increasing, reaching 4.6% in 1986. These higher than average losses will continue for a few more years due to the delay in obtaining approval for adequate transmission out of the Bruce nuclear complex. There will be no relief from this situation until the new 500 kV line from Bruce to London is brought into service, currently scheduled for March 1, 1991.

Forecast losses are assumed to be 4.6% for the years 1987 to 1990, 4.3% in 1991 and 4.2% in 1992.

1.4 Capacity Interruptible Loads

In general, capacity interruptible loads are those for which a customer contracts for power which may be interrupted by Ontario Hydro in exchange for a lower rate. Interruptible loads and Control Centre Controlled loads are subtracted from the Primary Load Forecast when System Planning derive their Planning Firm Load series.

Table 1.4: Capacity Interruptible Loads - East System

<u>Sum of Non-Coincident Customers' Capacity Interruptible Load</u> <u>December Monthly Peak - MW</u>						
<u>Interruptible</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>
25 Hz	6.5	6.5	12.5	19.5	19.5	19.5
60 Hz	761.9	796.6	810.2	896.6	899.7	923.9
Total	768.4	803.1	822.7	916.1	919.2	943.4
<u>In Terms of Generation*</u>						
25 Hertz MW	5	5	10	17	17	17
60 Hertz MW	595	623	633	699	701	720
Total	600	628	643	716	718	737

* At time of East System Peak

Currently only one customer in the West System has a capacity interruptible contract. West System's December Interruptible load in terms of generation is as follows:

1987 - 32 MW
1988 - 25 MW
1989 - 25 MW
1990 - 25 MW
1991 - 28 MW
1992 - 29 MW

1.5 Performance of Load Forecast 861208 in 1987

1.5.1. Actual Primary Demand Versus Forecast 861208

This section evaluates the performance of last year's forecast against the actual monthly peak and energy data for 1987. With the exception of the 1-hour peak for January, September and December and the energy demand for January, March and April, the Load Forecast 861208 under-forecasted demand. The greatest deviations from the forecast were for the months of May, June, July and August, when the weather was very hot and humid. For the year 1987, the actual demand was, on average, 1.6% greater in peak and 1.2% greater in energy than the Load Forecast 861208.

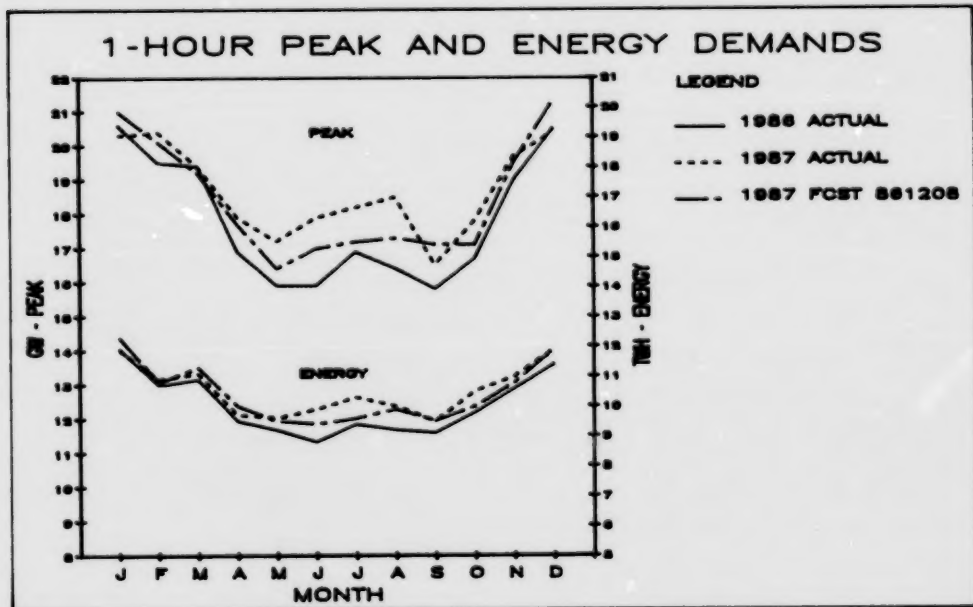
Table 1.5.1: Load Forecast Performance

	1-Hour Peak - GW					Energy - TW.h				
	Actual		% Yr/Yr Growth	1987 Forecast		Actual		% Yr/Yr Growth	1987 Forecast	
	1986	1987		861208	% Dev. *	1986	1987		861208	% Dev. *
Jan	20.6	20.3	-1.3	20.0	-3.4	11.9	11.9	0.0	12.3	-3.3
Feb	19.5	20.4	4.8	20.1	1.0	10.7	10.9	2.1	10.8	1.7
Mar	19.4	19.4	0.3	19.2	0.9	10.9	11.1	2.2	11.3	-1.8
Apr	16.9	17.9	6.2	17.7	0.9	9.5	9.7	2.9	10.0	-2.4
May	15.9	17.2	7.9	16.4	4.6	9.2	9.6	3.7	9.5	0.4
Jun	15.9	17.9	12.7	17.0	5.0	8.8	9.9	12.0	9.4	5.2
Jul	16.9	18.2	7.8	17.2	6.1	9.4	10.3	9.8	9.6	7.3
Aug	16.4	18.5	12.6	17.3	6.8	9.2	10.0	8.4	9.9	0.8
Sep	15.8	16.5	4.5	17.1	-3.7	9.1	9.5	4.5	9.5	0.3
Oct	16.7	17.8	6.6	17.1	4.3	9.8	10.5	6.9	10.0	4.7
Nov	19.0	19.7	3.7	19.5	0.9	10.6	11.0	4.2	10.8	2.4
Dec	20.5	20.4	-0.4	21.3	-4.0	11.4	11.9	4.5	11.9	0.0
Avg	17.8	18.7	5.1**	18.4	1.6**	120.6+	126.5+	4.9**	125.0+	1.2**

* Per cent deviation from forecast.

** Based on annual average

+ Total



1.5.2. Weather-Corrected Primary Demand Versus Forecast 861208

Table 1.5.2 below summarizes the monthly performance of Load Forecast 861208 in 1987 on a weather-corrected basis.

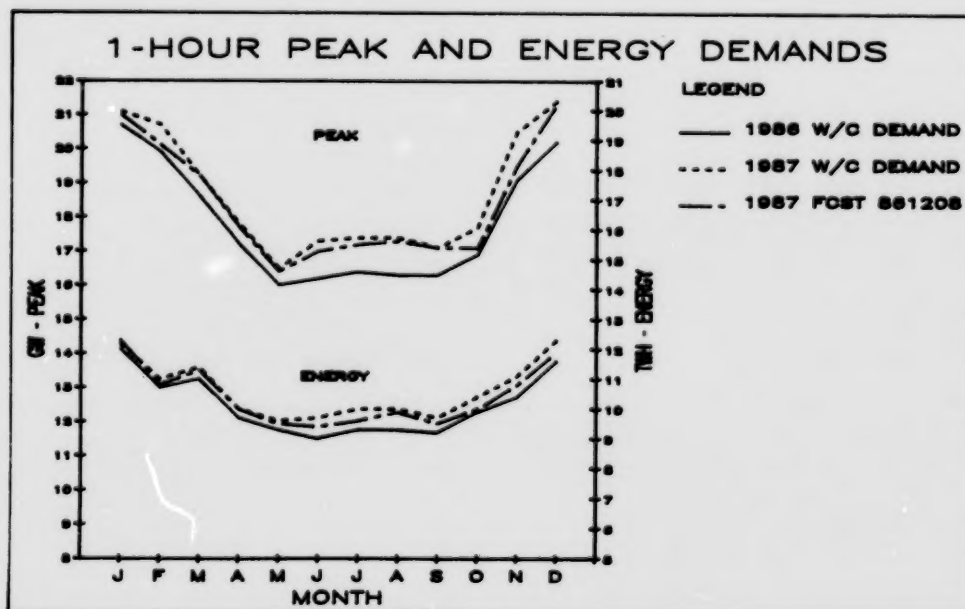
Table 1.5.2: Load Forecast Performance

	1-Hour Peak - GW					Energy - TW.h				
	Weather Corrected Demand		% Yr/Yr Growth	1987 Forecast 861208	% Dev. *	Weather Corrected Demand		% Yr/Yr Growth	1987 Forecast 861208	% Dev. *
	1986	1987				1986	1987			
Jan	20.7	21.1	2.1	21.0	0.6	12.0	12.2	1.7	12.3	-0.6
Feb	19.9	20.7	3.6	20.1	2.9	10.7	11.0	3.2	10.8	2.5
Mar	18.6	19.2	3.4	19.2	0	11.0	11.4	4.0	11.3	1.3
Apr	17.2	17.8	3.5	17.7	0.6	9.7	10.0	3.8	10.0	0.7
May	16.0	16.5	3.1	16.4	0.6	9.3	9.6	2.9	9.5	0.5
Jun	16.2	17.3	6.7	17.0	1.4	9.0	9.7	8.3	9.4	3.3
Jul	16.4	17.4	6.5	17.2	1.6	9.3	10.0	7.6	9.6	4.3
Aug	16.3	17.4	6.8	17.3	0.5	9.3	10.0	7.6	9.9	0.9
Sep	16.3	17.1	4.9	17.1	-0.2	9.2	9.7	5.4	9.5	2.1
Oct	16.9	17.7	4.4	17.1	3.5	9.9	10.4	4.7	10.0	3.3
Nov	19.1	20.5	7.4	19.5	5.0	10.4	11.1	6.7	10.8	3.2
Dec	20.2	21.4	5.6	21.3	-0.5	11.6	12.3	5.8	11.9	3.4
Avg	17.8	18.7	4.8**	18.4	1.4**	121.5 ⁺	127.6 ⁺	5.0**	125.0 ⁺	2.1**

* Per cent deviation from forecast

** Based on annual average

+ Total



2.0 LONG-TERM FORECAST - 1993 TO 2010

To plan the size of the power system needed to meet future demands, a long-range 20-year forecast, known as the Long-Term Load Forecast, is produced each fall. This forecast is more comprehensive and far-reaching than the Short-Term Forecast.

This chapter highlights the results of the Long-Term Primary Load Forecast and compares the peak and energy forecasts with Load Forecast 861208. This chapter also includes the results of two different approaches to forecasting, the econometric (EDEM) and end-use models, as well as two approaches to describing forecast uncertainty, a statistical confidence interval based on historical forecast performance and alternative load growth scenarios generated by the EDEM model using alternative macroeconomic scenarios. Discussion of the impact of Ontario Hydro's marketing activities closes off the chapter.

2.1 Highlights

2.1.1 Load Forecast 871214

Table 2.1.1: Long-Term Primary Load Forecast - 871214

Year	December 1-Hour Peak			Annual Energy		
	MW	Annual* Growth		TW.h	Annual* Growth	
		MW	%		TW.h	%
<u>Short Term</u>						
1986 Actual	20536			120.6		
1987	21314	778	3.8	125.2	4.7	3.9
1988	22060	746	3.5	129.7**	4.5	3.6
1989	22685	625	2.8	133.2	3.5	2.7
1990	23271	586	2.6	137.0	3.8	2.8
1991	23752	481	2.1	140.5	3.5	2.6
1992	24225	473	2.0	144.3**	3.8	2.7
<u>Long Term</u>						
1995	25773	500	2.1	155.5	3.7	2.7
2000	28370	519	2.0	172.0	3.3	2.1
2005	30907	507	1.8	187.7	3.2	1.8
2010	33106	440	1.4	201.4	2.7	1.5

Average Annual Growth

Period***	MW	%	TW.h	%
1986-1990	684	3.2	4.1	3.2
1986-1995	582	2.6	3.9	2.9
1986-2000	560	2.3	3.7	2.6
1986-2005	546	2.2	3.5	2.4
1986-2010	524	2.0	3.4	2.2

* Values for long term are for five-year period ending in year specified.

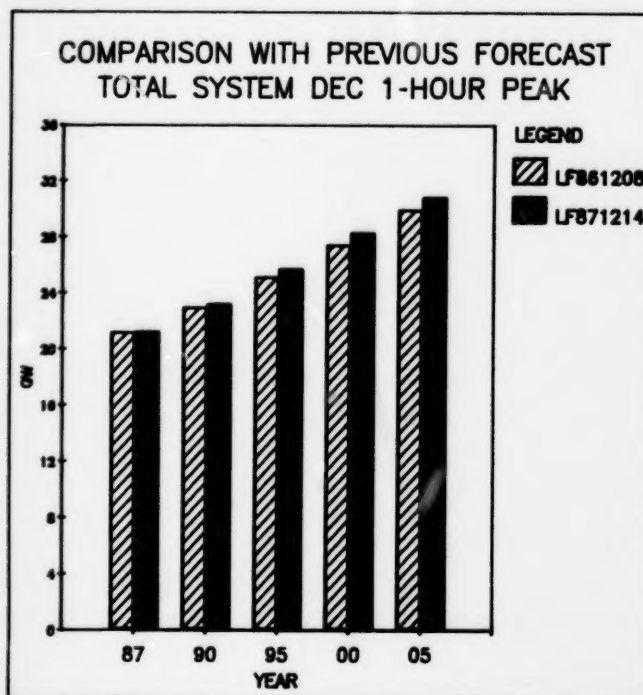
** Leap Year

*** Using actual 1986 values

2.1.2 Comparison with Load Forecast 861208 - Peak Demand

Table 2.1.2: December 1-Hour Peak Demand

Year	1987 Recommended Primary Load Forecast (MW)	Primary Load Forecast 861208 (MW)	Increase Over 861208	
			MW	%
<u>Short Term</u>				
1986	20536 (Actual)	20610		
1987	21314	21256	58	0.3
1988	22060	21962	98	0.5
1989	22685	22451	234	1.0
1990	23271	23031	240	1.0
1991	23752	23564	188	0.8
1992	24225	23903	322	1.4
<u>Long Term</u>				
1995	25773	25203	570	2.3
2000	28370	27508	862	3.1
2005	30907	30015	892	3.0
2010	33106	N/A	N/A	N/A
<u>Growth Rates</u>				
1987-2000	2.2	2.0		
1987-2005	2.1	1.9		
1987-2010	1.9	N/A		

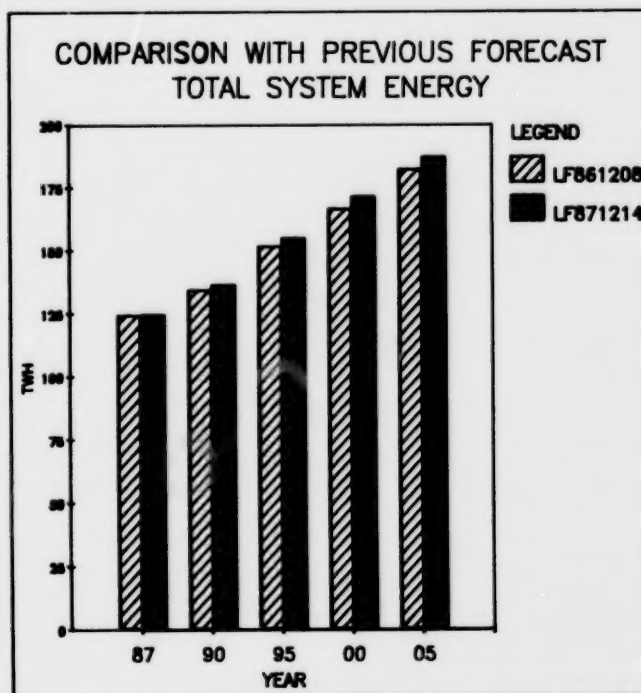


2.1.3 Comparison with Load Forecast 861208 - Energy Demand

Table 2.1.3: Primary Energy Demand

Year	1987 Recommended Primary Load Forecast	Primary Load Forecast 861208	Increase Over 861208	
	(TW.h)	(TW.h)	TW.h	%
<u>Short Term</u>				
1986	120.6 (Actual)	121.0		
1987	125.2	125.0	0.2	0.2
1988*	129.7	129.0	0.7	0.5
1989	133.2	132.1	1.1	0.9
1990	137.0	135.0	2.0	1.5
1991	140.5	137.9	2.6	1.9
1992*	144.3	142.3	1.9	1.3
<u>Long Term</u>				
1995	155.5	152.3	3.1	2.1
2000	172.0	167.2	4.8	2.9
2005	187.7	182.8	4.9	2.7
2010	201.4	N/A		
<u>Growth Rates</u>				
1987-2000	2.5	2.3		
1987-2005	2.3	2.1		
1987-2010	2.1	N/A		

* Leap Year



2.1.4 Comparison of Basic Load Forecast 861208 to Basic Load Forecast 871214

When comparing the 871214 Basic Forecast with Load Forecast 861208, it can be seen that the 871214 growth rates are marginally higher and are applied to a higher base. In addition, both peak and energy for this new forecast are higher over the entire forecast period.

Table 2.1.4: Basic Load Forecast Comparison

Year	December One-Hour Peak - GW				Energy - TW.h			
	Load		Load		Load		Load	
	Forecast	Forecast	Difference		Forecast	Forecast	Difference	
	861208	871214	GW	%	861208	871214	TW.h	%
1992	24.428	24.680	0.252	1.0	142.833	144.528	1.695	1.2
1993	25.014	25.410	0.396	1.6	146.262	148.395	2.133	1.5
1994	25.656	26.167	0.511	2.0	150.014	152.813	2.799	1.9
1995	26.358	26.888	0.530	2.0	154.116	157.026	2.910	1.9
1996	27.055	27.477	0.422	1.6	158.195	160.468	2.273	1.4
1997	27.746	28.190	0.444	1.6	162.235	164.629	2.394	1.5
1998	28.393	28.888	0.495	1.7	166.018	168.709	2.691	1.6
1999	28.960	29.613	0.653	2.2	169.335	172.942	3.607	2.1
2000	29.508	30.370	0.862	2.9	172.540	177.362	4.822	2.8
2001	30.162	31.206	1.044	3.5	176.360	182.244	5.884	3.3
2002	30.750	31.686	0.936	3.0	179.797	185.048	5.251	2.9
2003	31.345	32.282	0.937	3.0	183.277	188.529	5.252	2.9
2004	31.886	32.842	0.956	3.0	186.439	191.798	5.359	2.9
2005	32.405	33.297	0.892	2.8	189.479	194.455	4.976	2.6

Growth Rates

1987-2000	2.6	2.8	2.5	2.7
1987-2005	2.4	2.5	2.3	2.5
1990-2005	2.3	2.4	2.2	2.4
1995-2005	2.1	2.2	2.1	2.2

2.1.5 Forecast Uncertainty

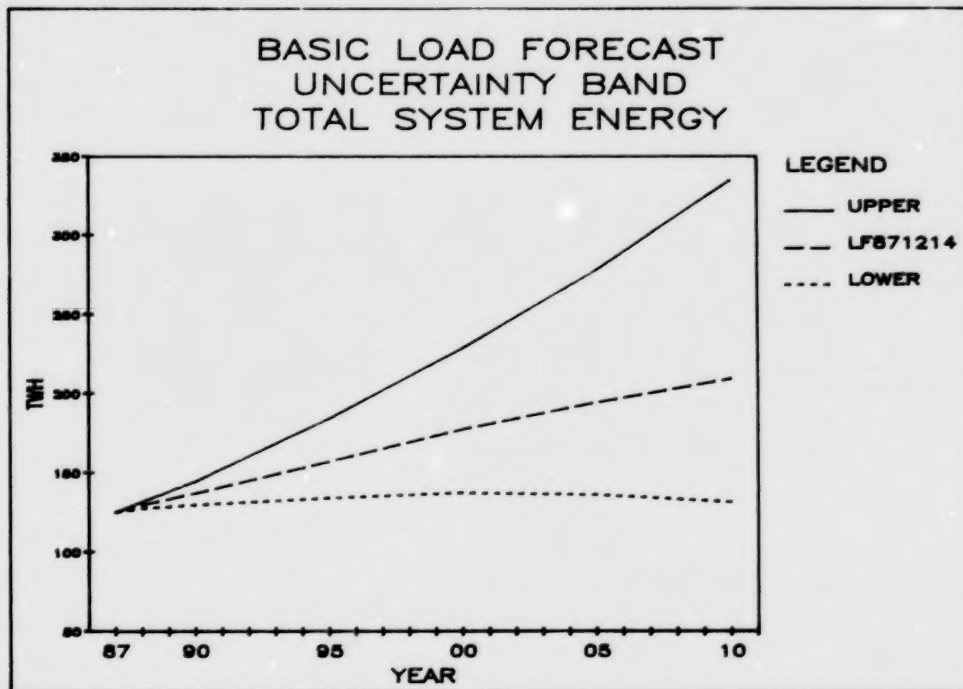
Historical load forecast performance is used as the basis for calculating the statistical uncertainty associated with the Recommended Basic Energy Forecast. The upper and lower limits given below specify a band of uncertainty such that there is a 40% probability of the actual energy demand falling outside of the range shown.

Table 2.1.5: Annual Basic Energy (TW.h)

	Lower	Forecast	Upper
1987		125.2	
1988	127.6	129.7	131.9
1990	129.9	137.1	144.6
1995	133.8	157.0	184.3
2000	137.5	177.4	228.7
2005	136.1	194.5	277.9
2010	131.1	209.5	334.6
Growth Rates			
1987-2000	0.7	2.7	4.7
1987-2005	0.5	2.5	4.5
1987-2010	0.2	2.3	4.4

To gain a perspective on the size of this uncertainty, it should be noted that in 2010, the width of the uncertainty band is roughly 60% greater than the energy generated and purchased by Ontario Hydro in 1985.

The above uncertainty is associated with the past forecast errors alone. A further discussion on risks associated with the forecast is found in 2.2.3.



2.2.1 Methodology of the Long-Term Basic Load Forecast

Electricity demand depends, in the long run, on a large number of factors and a complex set of interrelationships between them. Forecasting models can be built in several different ways to take advantage of different levels of assumptions and known qualities about these interrelationships.

For example, total electricity demand can be derived by adding up the demand created by each and every end-use of electricity. A forecast taking this approach, called an end-use forecast, requires projections of activity in each sector and industry along with forecasts of electricity and energy use at each activity level as technology improves in the future. In this sense the model is engineering-oriented. The forecaster's critical task in an end-use model is to make assumptions and projections regarding activity levels and electricity utilization technologies.

Another way of forecasting electricity demand is to model explicitly the fundamental relationships among its determinants. Such a system of relationships can be quite complex. One way to do this is with a long-term demographic-macroeconomic model linked with sectoral models for distinct sectors of the economy (residential, commercial and industrial). This model is driven by demographics and detailed knowledge about the present structure and trends of

macroeconomic relationships within sectors and industries. The outputs of such a complex model consist both of total energy demand in the future and the market shares of electricity and other fuels. This approach is called multi-equation econometric modelling.

The Load Forecasts Department has maintained separate models for each of the above approaches.

The use of more than one model allows the forecaster to take into account more of the available information about the past in order to assess the future. Any differences between the forecasts are instructive, since they can be traced directly to the model or to the underlying assumptions. This gives the forecaster the ability to ensure consistency and the validity of the final forecast recommended.

Similar considerations apply to short-term forecasting also. However, in the short term, the variability of weather affects electricity demand more than the set of variables relating to the level of economic activity, fuel prices, or demographics. Demand in the short term is also heavily determined by the existing stock of energy-using capital equipment, which tends to change only very slowly. Therefore, it is more useful to view demand in the short-term as primarily related to demand in the recent past, and then to apply a knowledge of external changes and judgment to round out the energy demand picture.

2.2.2 Discussion of Major Assumptions

A forecast based on the methodologies described in the previous section requires assumptions about some set of variables which represent the important influences on electricity demand, such as economic growth and relative energy prices. The number of such variables can range from one for the most simple single-equation model to several thousands for the end-use model. The basic assumptions are common to all three models, but other key assumptions are made independently. The resulting forecasts, therefore, maintain a degree of independence, and provide a load forecaster with information both on the forecast and on the effect of different approaches.

The most important two factors in any model (computerized or mental) of the demand for electricity in the long run are the projections of the general level of economic activity and of the price of electricity relative to other fuels. These factors can be incorporated into the models and the forecasting procedure in any of several ways. Because these factors are so central, each of the models has been run using similar assumptions. This approach allows the model results to reflect important differences in other kinds of assumptions, and allows the forecaster to understand the sources of the differences.

(1) Economic Growth

Economic growth will follow the path outlined in the most-likely forecast of the Economics and Forecasts Division's Economic Outlook, Annual Review 1987. This outlook predicts real economic growth in Ontario averaging about 2.7% per year over the period 1986 to 2010. Following the trends in population growth, the economic growth rate is forecasted to slow down steadily.

Ontario population in the year 2010 will be just under 11.2 million.

Ontario labour force in the year 2010 will be over 6 million, at an average participation rate of just under 70 percent. The unemployment rate will

decline slowly from present levels to 3.8% by the year 2001, remaining at that rate thereafter.

The rate of technical progress will recover from its long-term negative trend to a constant level below the average of the 1960s, but above the average of the last decade.

The stability of social, economic, and financial institutions will be retained. No international financial crisis will seriously affect the Canadian financial system. There will be no major supply disruptions in basic commodities, like fuels.

The 1987 Annual Economic Outlook forecasts a level of Gross Domestic Product (GDP) in Ontario of almost \$115 billion (1971 dollars) in 2010, an increase of 1.4 percent over last year's economic outlook. The increase is the result of a slightly higher population projection and a more upbeat outlook for the province's industry. The inflation outlook has remained virtually unchanged from last year's, which foresees a continuation of the relatively restrictive money supply policy.

Table 2.2.2.1: Economic Outlook

	Ontario Real GDP (Millions of 1971\$)				Ontario Consumer Price Index (1981 = 100)			
	Fall		Fall		Fall		Fall	
	1986	%*	1987	%*	1986	%*	1987	%*
1987	63,684	3.5	63,867	3.5	139.0	4.1	142.1	5.6
1990	69,792	3.0	69,721	2.8	160.9	5.5	169.8	6.0
1995	81,301	3.1	81,613	3.2	205.3	5.0	216.7	5.0
2000	91,985	2.5	92,338	2.5	268.4	5.5	283.2	5.5
2005	102,558	2.2	103,457	2.3	350.8	5.5	370.1	5.5
2010	113,232	2.0	114,786	2.1	469.4	6.0	495.3	6.0

* Annual Growth Rate 1987 and 1990, 5-year annual average 1995 - 2010.

(2) Energy Prices

**Table 2.2.2.2: International and Domestic Energy Prices -
Reference Case Real 1987 Dollars**

	Wholesale Prices			Ontario Retail Prices - Residential		
	International Oil	Domestic Oil	Natural Gas	Fuel Oil	Natural Gas	Electricity
	Persian Light - F.O.B. US\$/Bbl	TRAC Cdn\$/Bbl	TCG Cdn\$/Mcf			
1987	17.50	24.50	3.70	31.4	6.28	5.50
1990	17.50	24.90	3.45	31.4	5.93	5.40
2000	23.50	33.00	4.70	36.5	7.57	4.93
2010	25.50	35.00	5.10	37.7	8.13	4.80

After a dramatic collapse of world oil prices in 1986, OPEC's renewed coherence and escalating hostilities in the Middle East were the major reasons that crude oil prices have surged upward and stayed relatively steady around OPEC's new official price of US \$17.50 per barrel. In the short and medium term, a major

challenge for OPEC is to set its price at the level that would be a trade-off between the low prices needed to impact significantly on supply and demand in longer term, and the high prices needed to meet the short-term economic and political pressures to increase cash flow. In the short term, prices may be under strong downward pressure due to recent OPEC over-production at a time when there has been only a moderate increase in world demand. In general, our most likely price forecast and underlying assumptions have not changed much from last year: weakness for the rest of the 1980s is projected to be followed by upward pressure in the 1990s.

The domestic oil market is expected to continue to be deregulated so that Canadian wholesale oil prices are projected to fluctuate with the trend in the international oil prices, in practice with West-Texas Intermediate crude at Chicago, subject to exchange rate and transportation adjustments.

The Canadian natural gas market made substantial steps toward deregulation late last year and operates now in a more market-oriented environment. However, the market is still dominated by the regional distributors and the major beneficiaries of the new system are the industrial customers. A major uncertainty for the future natural gas market in Canada is the free trade agreement. With continued deregulation in both Canada and the United States and free trade in energy between the two countries, the combination of a tighter U.S. market for gas and the increasing cost of marginal supplies in the United States is expected to drive up the price of gas in both the United States and Canada.

Electricity prices in the Reference Case are projected to rise on average below the rate of inflation for the entire forecast period. The real price level of electricity relative to manufacturing wages is expected to incur a steady decline over the next 20 years. Electricity's price competitiveness has deteriorated, especially over the last two years, and this trend is expected to continue for another couple of years (relative to natural gas). However, the long-term energy price trends are still expected to be characterized by gradual improvement in electricity's relative price.

2.2.3 Risks to the Forecast

The principal risks identified for the forecast include the rate of real economic growth, the Ontario Hydro rate levels and structure, the prices of other fuels, and the effect of Ontario Hydro's demand management program.

In the forecast, as reported in this document, some of the risks associated with these uncertainties are addressed by the use of three alternative scenarios (in addition to the most likely). Each scenario shows the impact on system demand of a set of coordinated alternative assumptions about economic growth (including population growth) and energy prices. The scenarios allow some explicit consideration of the outcomes possible given underlying conditions different from those envisioned in the central forecast. The forecasts of electricity demand made for each of these scenarios indicate a wide range of risk arising from the economic outlook alone.

The Basic Load Forecast includes the impact of Ontario Hydro's research, education and promotion programs on electricity sales. A projection of the size and effectiveness of Ontario Hydro's indirect incentive programs is obtained independently of the Basic Load Forecast. These estimates are netted out of the Basic Load Forecast figures to obtain the Primary Load Forecast. Therefore, any uncertainty with the forecast of these marketing targets will directly affect the Primary Load Forecast. However, it is too early to be able to quantify the impact of the indirect incentive programs on the uncertainty

of the Primary Load Forecast. Given the wide bandwidth surrounding the Basic Load Forecast, no additional change has been made to derive the bandwidth for the Primary Load Forecast.

Given the sources of external uncertainty, in addition to the uncertainty attached to the load forecasting process itself, the necessity for care in the use of the load forecast cannot be overstressed. The load forecast cannot be used as only a single number; the sources and consequent ranges of forecast error must be considered as well.

For this reason, the band of error associated with the forecast is as important as its central tendency.

2.3 Results of Forecasting Models

To quantify the effects of the complex network of factors that determine energy demand in the longer term, the results from an econometric and an end-use model are both analyzed. The long-term forecast is then integrated with the short-term forecast and final adjustments based on judgement are made. The resulting forecast is referred to as the Basic Load Forecast.

2.3.1 Economic and Demographic Energy Model--EDEM

Introduction

EDEM is an econometric model. The relationship between energy consumption and the variables which determine the level of this consumption has been estimated for the period 1962 to 1986. EDEM predicts the level of consumption for Ontario as a whole by individual fuel -- electricity, natural gas, oil and coal -- and by consuming sector -- residential, commercial and industrial. The major factors which influence the level of consumption are scale factors, such as the number of households and the level of output, fuel prices and exogenous time trends. The relationships between pair-wise variables are usually summarized by elasticities which measure the responsiveness of the variable of interest to the factors noted earlier. Forecasts of these variables are then explicitly inserted into the estimated relationship to forecast the energy demand.

Demographics and Key Economic Assumptions

Two facets of the relationship between the demographic and economic forecasts in the Economic Outlook and the EDEM model will be explained.

(1) Demographics

The detailed demographic forecast contained in the Economic Outlook was derived using the demographic portion of the EDEM model. The assumptions which determine total population include fertility rates, migration (including immigration) and mortality rates.

These demographic variables affect the load forecast in two ways:

- i) Via the number of households, which is an important determinant of energy use, directly in the residential sector and indirectly through the demand for output in the commercial and industrial sectors.
- ii) Via the labour force growth rate, which depends on population growth and participation rate. Age-sex specific participation rates are assumptions

in the model. These assumptions take into consideration social trends, such as increased leisure, and the impact of economic growth on the demand for labour.

Details of the demographic forecast are available upon request.

(2) Economic Growth

EDEM has its own macro-economic forecasting module. The module was built specifically to model long-term potential growth rather than short-term fluctuations around this path. Long-term growth is determined by the rate of growth of capital and labour and the rate of technical progress. The rate of technical progress is that growth in economic output which cannot be explained by the growth in the labour force or the capital stock. Thus, the key economic assumptions in EDEM relate to the rate of technical progress, the unemployment rate, the date at which the economy reaches the long-term growth path and whether the economy is growing at its full potential or somewhat below it. The forecast of economic growth in EDEM is tuned to the Annual Economic Outlook, not only ensuring consistency but also providing a cross-check on the long-term forecast contained in the Annual Economic Outlook.

The rate of technical progress (or the growth rate of total factor productivity) is a key input to the EDEM forecast. In the current forecast, the long-term rate of technical progress (rtp) is around 1% per year. After a relatively high growth in 1984 of 5.3%, due to the strong economic recovery, rtp fell in 1985 to 1% and rebounded slightly to 1.6% in 1986. This forecast implies a significant turnaround in the growth of total factor productivity, which has been falling over much of the last two decades.

However, as computer technology becomes more pervasive and makes production in general more efficient, and given that energy prices have decreased significantly and are likely to be stable over the medium term it is reasonable to expect a return to higher and more stable productivity growth. Generally lower tariff protection in Canada, which is projected in the Economic Outlook, is also expected to boost productivity by forcing manufacturers to be more competitive. Without such productivity growth, it is difficult to predict sustained economic growth in Ontario for the next two decades.

The long-run full-employment rate is assumed to be approximately 4%. EDEM is assumed to reach its long-run growth path in 2002 and the Ontario economy is assumed to grow at a fraction below full potential, thus allowing for some spare capacity.

Electricity and Energy Demand Forecast by Sector

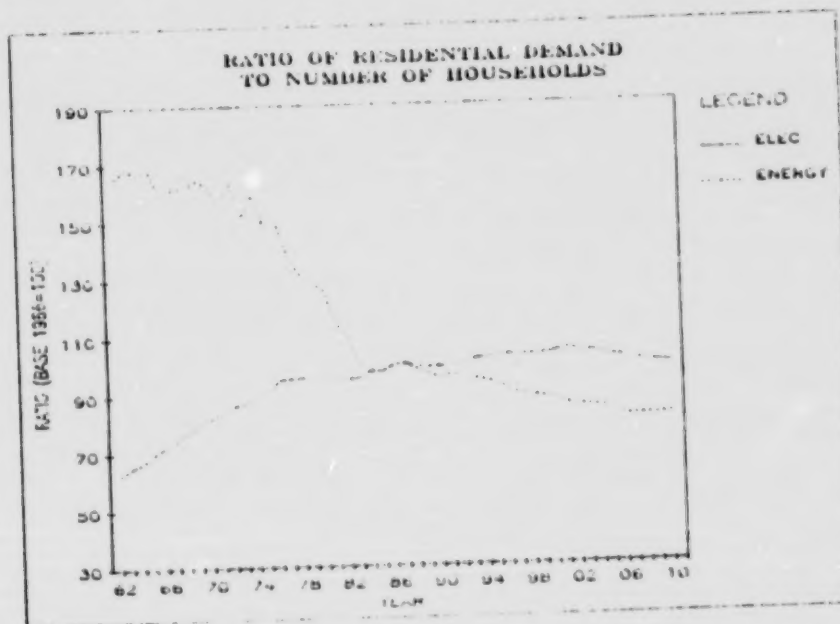
This discussion will focus on electricity and energy intensity. Since the situation in each of the major consuming sectors is quite different, the denominator of the intensity measure is chosen to reflect best the reality of the dominant activity indicator, whether demographic or economic.

(1) Residential Sector

To illustrate intensity indices in this sector, both total electricity use and energy use, divided by the number of households, were calculated (see chart on page 21). The electricity intensity index grew quite strongly and steadily over the 1962 to 1976 period. This, in part, reflects the falling real price of electricity over the 1962 to 1968 period and the fairly constant real price for 1968 - 1975. The combination of rising real income and favourable

electricity prices, characterizing the years 1962 to 1968, resulted in a strong increase in appliance use, as well as in space and water heating. The average electricity intensity growth for 1962 - 1976 was 3% per annum. However, this growth rate slumped sharply thereafter until 1982, presumably in response to the large electricity price increases in 1977 and 1978. Growth in electricity intensity picked up again in 1984 till the end of 1986. Since real electricity prices continued to increase during this period, this growth is most likely a response to the rapid gains in income since the 1982 recession. As real income per household is forecast to increase and real electricity prices to decline in the mid- to long-term, electricity intensity is projected to grow until the year 2001, when a slow rate of decline sets in. The joint impact of a 0.3% electricity intensity growth and a 1.3% household growth for 1987 - 2010 sums up to a 1.6% residential electricity growth for those years.

The energy intensity index fluctuated around a downward trend until 1976 and fell steadily from 1976 until 1984, when some growth began to appear. The energy intensity index declines gradually for the years 1987 - 2010. This is due to the movement away from oil which is forecast to continue, but at a slower rate since oil saturations are already fairly low. In addition, greater efficiency of gas use is predicted in the future, as real prices of gas rise.



Appliance Use and Electricity Saturation

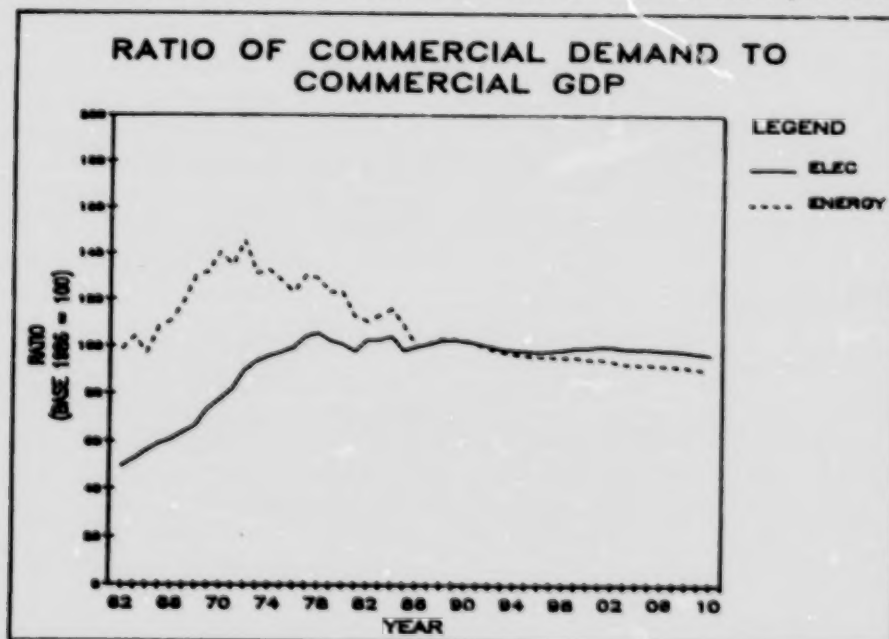
The pattern of electricity use per household is jointly determined by the usage and saturation of individual appliances. In EDEM an aggregate use index (electricity use per household adjusted to take out the effects of the growth of appliance stock) is modelled and forecast. This use index was growing from 1962 until 1972 - an era of falling or fairly constant real electricity prices and growing income per household. From 1973 to 1986, when real electricity prices were rising, the tendency changed and the use index declined at a gradual average annual rate of .7%. For the future, technological change is projected to cause further decline in use, but at a slower rate.

The aggregate saturation index has also grown over the entire historical period. Three distinct phases may be identified: 1) fairly steady growth from 1962 to 1972, corresponding to the period of declining or constant real electricity prices, increasing income and decreasing electricity prices relative to oil till 1969; 2) faster growth from 1973 to 1978, reflecting the increasing substitution into electricity and the fairly gradual drop in electricity prices relative to oil; and (3) slower growth rates for the period 1979-1986, due to lower or negative growth in income per household (as a result of the 1982 recession), and average positive growth of electricity prices relative to gas. This index is forecast to continue to grow until 2010 at an average rate of 0.9% per annum, as favourable electricity prices and steady income growth are projected.

(2) Commercial Sector

The electricity and energy intensity indices for the commercial sector are obtained by dividing total consumption by total Ontario real commercial GDP (see chart below). Electricity intensity increased steadily from 1962 until 1978 at an average annual rate of 5% and then fluctuated till the end of the historical period. For the future, the forecast shows a further increase from 1987 to 1989 followed by a period of decline for the years 1990 - 1996. This index rises again after 1996 to level off at the end of the forecast period. Variations in electricity intensity are sensitive to both end-use electricity efficiency improvement trends and changes in the electricity usage patterns within the commercial sector. Changes in electricity use are caused by inter-fuel substitution and development of new technologies, which offset efficiency gains.

The trend for energy intensity demonstrates that, from 1962 to 1972, the index grew at an average of 3.9% per annum and then decreased till 1986. The forecast period displays a rise in the index for 1987 and 1988 and then a slow decline till 2010. Similar to the residential sector, the total energy intensity continues to fall faster than electricity intensity, due, in part, to the more efficient use of fossil fuels, particularly for space heating. This pattern is predicted to continue until the end of the forecast period.

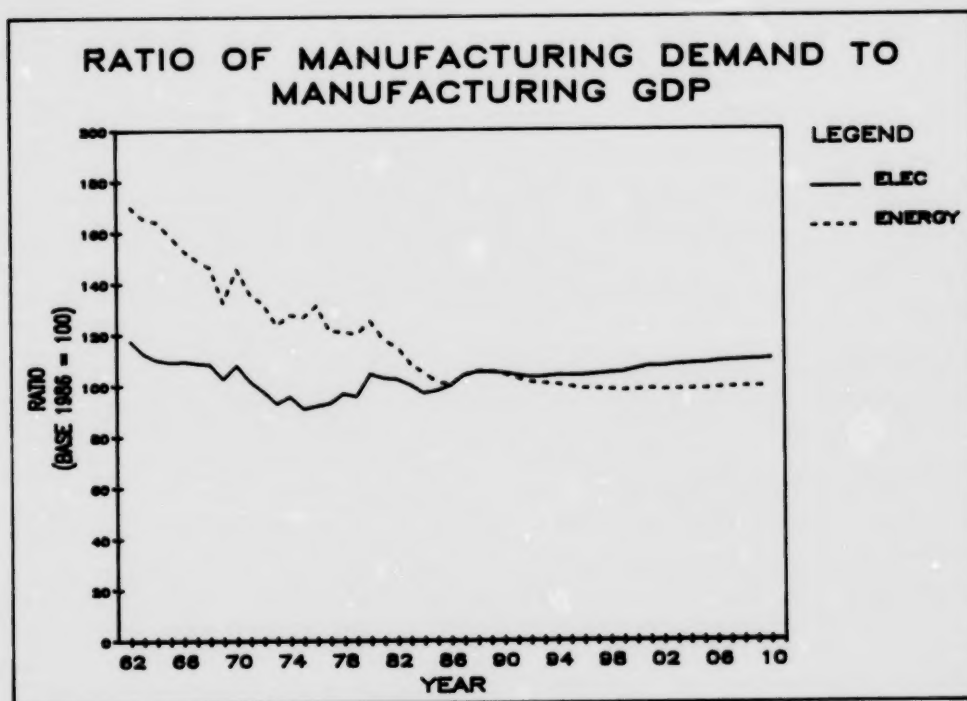


(3) Manufacturing Sector

The index of intensity for the manufacturing sector is energy or electricity consumption divided by Ontario real manufacturing GDP (see chart below). The historical period has a very small overall trend toward reduction in electricity intensity. In contrast, overall energy intensity has definitely declined at a fairly steady rate from the start of the observed period. This is due in part to the rise in the real prices of fossil fuels in the 1970's.

The years 1962-1969 are characterized by a decline in both energy and electricity intensities. In 1970, both intensity indices rose and dropped again from 1971 to 1973, during the oil crisis. The perturbations observable in 1969 and in 1975 result from the strikes in the primary metal and pulp and paper industries, respectively. Both electricity and energy intensity indices were quite volatile from 1974 to 1980. They began to fall in 1981 and continued doing so throughout the recessionary period of 1982 - 1983. For the rest of the historical period, energy intensity dropped at a faster rate than electricity intensity.

For the forecast period, electricity prices are projected to be fairly constant and further increases in oil and natural gas prices are expected. Consequently, electricity intensity is predicted to stay quite flat, as efficiency gains are offset by growth in new uses, and further declines in energy intensity are expected to take place, albeit at a slower rate.



The 1987 EDEM Forecast

The EDEM forecast results project that total residential electricity use will increase at a compound rate of 1.6% over the period 1987 to 2010 - about .8% less than the growth rate of total electricity demand. In fact, the rate of growth of residential demand follows a downward trend from the late 1990s on, due to the slowing down of population growth, which continually pulls down the rate of growth of total electricity demand.

The commercial sector has faster growth rates for both total energy and electricity than the residential sector. Its electricity growth averages 2.8% a year for the period 1987 to 2010. Electricity's share of the commercial market grows from 35.1% in 1987 to 38.6% in 2010.

In the industrial sector (manufacturing and mining), electricity growth averages about 2.5% a year between 1987 and 2010, while total energy grows slightly more slowly. Electricity's share of this market, therefore, increases from 22.4% in 1987 to 25.3% in 2010. This is a slightly greater relative increase in market share for electricity than is projected for the commercial sector.

Table 2.3.1: EDEM 1987 Forecast

Year	Residential	Commercial	Industrial	Adjust- ments**	EDEM Basic Electric Energy
	TW.h	TW.h	TW.h	TW.h	TW.h
1986 Actual	33.5	40.7	44.8	1.6	120.6
1987	33.7	43.4	47.6	1.4	126.2
1990	35.1	47.2	51.2	1.6	135.1
1995	39.7	56.5	60.4	2.0	158.7
2000	44.0	65.8	68.8	2.5	181.1
2005	46.9	74.9	77.0	2.9	201.7
2010	48.4	82.0	84.7	3.2	218.2
Growth Rates*					
1986-2010	1.5	3.0	2.7		2.5
1987-1990	1.4	2.8	2.4		2.3
1987-2000	2.1	3.2	2.9		2.8
1987-2005	1.9	3.1	2.7		2.6
1987-2010	1.6	2.8	2.5		2.4

* Average annual percent change.

** Ontario Hydro losses less Ontario electricity not sold by Hydro.

2.3.2 End-Use Model Forecast

Introduction

End-use modelling uses a "bottom-up" approach to energy analysis. It starts with the initial stock of energy using devices and an estimate of future demand for the services of these devices. Energy conversion efficiency of existing equipment, penetration of higher efficiency equipment and relative fuel shares for each end use are analyzed and input to the system at a highly disaggregated level. The model then combines these components and arrives at the total energy demand.

Electricity and Energy Demand Forecast by Sector

This section will present a detailed discussion of electricity and energy projections by sector.

(1) Residential Sector

(a) Housing Stock Projections

The main driving variable in the residential sector of Ontario Hydro's end-use model is the housing stock. Projections of housing stock are closely tied to the demographic projection prepared by the Economic Forecasts Section of the Economics and Forecasts Division. This year's revision of the demographic projections contains assumptions of higher fertility rates and increased immigration. The corresponding provincial population is 1.2% higher than our previous forecast in the years 2000 and 2005. In addition to these changes, forecasts of vacancy rates were increased from 1% to 3.5% in the long term to reflect the anticipated return to a more stable housing market.

Table 2.3.2.1: Housing Stock Forecast

Year		Total Housing Stock ('000s)	Average Annual Additions to Housing Stock				Total
			Single Detached	Semi Detached	Row Houses	Apartments	
1986	Actual	3,327	42,600	2,000	4,300	11,400	60,300
1987		3,409	55,000	3,400	5,100	21,300	84,800
1990		3,647	52,100	3,200	4,800	20,200	80,300
1995		4,014	48,300	3,000	4,600	19,000	74,900
2000		4,307	35,100	2,200	3,400	14,100	54,800
2005		4,529	28,800	1,900	2,800	11,700	45,200
2010		4,701	22,800	1,500	2,300	9,300	35,900

(b) End-Use Analysis

Average annual growth in electricity use during 1980-1985 has been 2.5%. We expect to experience a higher growth of 2.7% between 1986-1990 simply due to the boom in the construction industry. Growth will moderate to the 2.5% level during the next five years (1991-1995), and it will gradually slow down to 1.8%, 1.5% and 1.3% for the next three five year periods in the forecast horizon. This results from a combination of both lower housing stock growth and conservation and efficiency improvements.

Space Heating: Approximately 28% of all electricity use in the residential sector is for space heating. Despite the higher insulation levels in new homes assumed in the forecast, by 2010 space heating will use about 31% of residential electricity. This is the result of an increase in the penetration of electric space heating from 18% to 22%. Oil's share of the space heating market has dropped from 36% in 1980 to 18% in 1986. Its share fell by 2% in 1986 despite the drop in oil prices and the end of the government's off-oil program. It is projected that this trend will continue, although more moderately, throughout the forecast period. Electricity gained only 4% of this market, moving from 14% in 1980 to 18% in 1986. Meanwhile natural gas gained 11%, moving its share from 47% in 1980 to 58% in 1986. The projections for electricity's market share in the space heating market is a moderate increase to 21% by year 2000, 22% by year 2005 and 23% by 2010.

Water Heating: In 1987 about 17% of all residential electricity use will be for water heating. However, the importance of electric water heating will decrease to 12.5% by the year 2010. Electricity's market share dropped from 52% in 1980 to 43% in 1986, while natural gas increased its share to 55% from 43%. Most of this occurred as homeowners who had electric water heating and fuel oil space heating switched to natural gas for both space and water heating. But the figures above also reflect the fact that natural gas captured the vast majority of the new water-heating market along with space heating.

The projection is that the electric water heating market share will drop to 38% by year 1990 from the current 43% level, and stay at the 35% level throughout the forecast horizon.

Space cooling: The use of electricity for space cooling, which was less than 2.5% of residential use in 1987, will increase moderately by the year 2010, due to the higher market penetration of air conditioners.

Appliances: Appliance saturation rates are assumed to increase with rising personal incomes. There is also a larger market simply due to new housing. Partially offsetting these two forces is the trend towards higher efficiency in appliances. The overall appliance electricity consumption is around 53% of all electricity used in the residential sector and is expected to grow at just over 2% per year during the forecast period. The following table gives electricity demand by appliance type for 1987 and 2010.

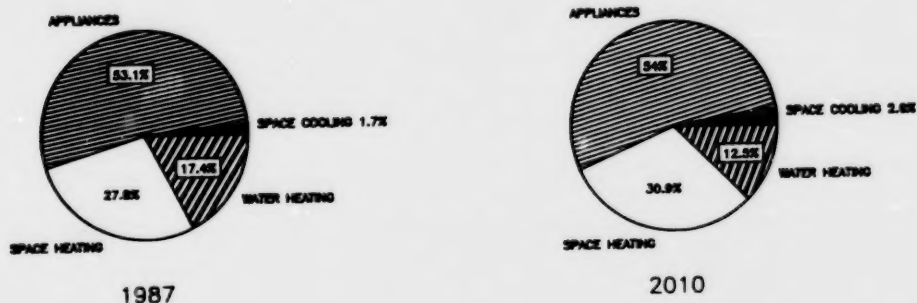
Table 2.3.2.2: Electricity Use By Appliance Type (TW.h)

	1987	2010
Stoves	3.6	4.4
Refrigerators	3.9	4.9
Freezers	1.8	3.0
Room Air Conditioners	0.4	0.6
Dishwashers	0.3	0.9
Clothes Washers	0.2	0.3
Clothes Dryers	2.0	3.2
TVs/Radios	1.7	2.1

Stoves and refrigerators will continue to be the biggest electricity users, but the market for these appliances is already saturated. The biggest saturation rate improvement is forecast in the dishwasher market. Dishwashers are expected to become a standard feature in most new construction.

The composition of final demand for electricity in the residential sector by end use is given in the following figure.

RESIDENTIAL ELECTRICITY USES



(2) Commercial Sector

(a) General

The analysis of energy use in the commercial sector starts with the building stock. Nine building types are examined. These are education, health, offices, retail, warehouses, recreation, religious and cultural, hotels and restaurants and a miscellaneous category. The forecast of total floor space for the commercial sector as a whole shows a growth from approximately 1.5 billion square feet in 1986 to roughly 2.5 billion square feet in 2010. This represents a growth rate of about 2.3% per annum. The four largest (in 1980) subsectors experience vastly different growth patterns. Offices will experience the fastest growth at close to 3.0% per year over the entire period while education will hardly grow at all. The retail sector will share in the boom affecting offices while warehouses, the fourth largest, will experience only moderate growth. Changing demographics and the continuing shift towards a service-based economy are the key issues affecting the floor space forecast.

In 1986, electricity demand was approximately 34.7 TW.h. This represents a substantial increase over 1985 (7.2%). The main reason for this growth would appear to be the extremely high rates of commercial sector activity - as measured by employment, Gross Domestic Product and construction. The financial, real estate and banking sectors in particular enjoyed extremely high growth rates during 1986. The post-recession growth that the industrial sector experienced in 1984 and 1985 was delayed somewhat until 1986 for the commercial sector. During 1986, massive amounts of rehiring and new employment opportunities occurred in the commercial sector and this in turn was reflected in electricity use. The office, retail, warehouse and accommodation sub-sectors saw big increases in electricity use over 1985 levels. By 2010, it is expected that the commercial sector will consume approximately 59.9 TW.h. For the period 1987 - 2010, the growth rate is expected to be 2.3% per annum. When floor space and electricity usage forecasts are compared, a slight trend to increasing electrical intensity per square foot can be identified. This occurs in spite of increasing conservation practices and technological potential to reduce electricity demand.

(b) End-Use Analysis

Total energy use will grow, by the year 2010, at a rate of approximately 1.5% per year. Energy usage patterns will also be changing over the next twenty years. Heating, the predominant end use, will continue to decline in terms of its share of total energy consumption. The main reason for this is the large conservation potential that exists in the area of space heating -- both in terms of technological improvements and the wise use of energy in general. The biggest effect will be on the demand for fossil fuels. Oil usage will continue to decline while natural gas will experience slow to moderate growth. Electricity will also be playing a larger role in the area of heating. Heat pumps will account for a large proportion of this electric heating demand.

The other end uses in the commercial sector will also be experiencing changes and shifts over the forecast period. Lighting demand - the single largest user of electricity in the commercial sector - will increase due to the increase in floor space. However, new ballast systems, high intensity discharge lights and the like will make the average lighting system more efficient. As a result, electricity demand for lighting will grow more slowly than either floor space or total electricity demand, at approximately 1.7% per annum.

Air conditioning will play a bigger role in the demand for electricity in the commercial sector. Although air conditioning systems will become increasingly more efficient, they will be installed in more and more buildings. For example, it is expected that for new buildings the average penetration rate for air conditioning will be roughly 50%. Offices, health care, retail and accommodation buildings will have air conditioning penetration rates close to 100% while even buildings which have not usually been air-conditioned, such as churches, schools and cultural institutions, will begin to account for more air conditioning demand.

An area of rapid growth in terms of energy usage for the commercial sector is "miscellaneous" uses. These include office machines, personal computers, ventilation systems, refrigeration, etc. Of these, ventilation and office equipment (including personal computers) are having a tremendous effect on electricity demand, both peak and total energy. Earlier attempts to save large amounts of energy in space heating meant that air exchange systems (ventilation) were often set extremely low. Recently, concerns over health and air quality have led to these systems again being run at pre-oil shock levels. This fact has had a dramatic effect on electricity usage patterns in commercial buildings, especially offices. The impact of computers on electricity demand is only beginning to be examined, but it is becoming clear that computers will be as important in the miscellaneous category as ventilation. In fact, recent studies show that computers can account for as much as 50% of electricity demand in a large modern office building. Of this demand about one third would be in terms of direct electrical load and two thirds as indirect loads such as space cooling and lighting.

(3) Industrial Sector

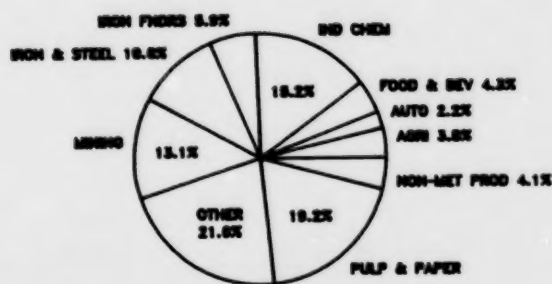
(a) General

The industrial sector in the current end-use model consists of 13 specific industries (including mining) and a residual category for all other manufacturing industries. The activity carried out by an industry is defined in terms of a series of processes, with alternative technologies available to perform each process.

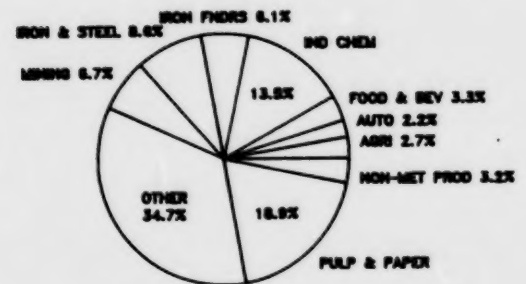
Ontario industries have shown continued improvement in energy efficiency during the last decade. Electricity consumption per unit of physical output is expected to continue this conservation/efficiency improvement trend. Coupled with these efforts, which reduce electricity use, is the emphasis on electricity-intensive future automation and process modernization which increases electricity use.

Average annual growth in electricity use in the industrial sector during the period 1987-2010 is forecast at 2.2%. The output level of the "Other Manufacturing" category, representing output not addressed by the 13 specific industries studied, is forecast to grow steadily at an annual rate of 3.5%. The main contributors will be the Plastics, Electronics and other high tech (communications) industries where production is expected to be electricity-intensive. The shares of electricity demand by industry are shown in the following Figure.

INDUSTRIAL ELECTRICITY DEMAND BREAKDOWN BY INDUSTRY



1987



2010

A moderate decrease in oil intensity is assumed in most processes leading to an average annual growth of 0.7% over the forecast period. The stronger position held by natural gas in most industrial processes will result in a healthier growth rate of 1.5% per annum. Finally, growth of coal and coke use is really dictated by the iron and steel industry. The assumed continued use of blast furnaces for pig-iron production results in heavy use of coking coal. However, the very slow growth assumed for this industry will result in only a 1% average annual growth for this fuel.

(b) Key Industries

Automobile manufacturing: Product output is forecast to grow at an annual rate of 8.2% until the year 1992. Growth thereafter is expected to slow to an annual rate of somewhat less than 1%. Increasing use of robotics is assumed, but several mitigating factors are expected to decrease the net effect of automation on electricity consumption per vehicle produced. These include decreased lighting, heating, ventilation and air-conditioning consumption (reduced labour force), fewer reworks, and lower overhead (increased production rate). The bottom line is that electricity demand is expected to grow by an annual rate of 2% over the forecast period.

Cement/clay/glass: These industries play a major role as suppliers to residential and commercial construction. Forecasted annual growth rates vary from 1% for the cement industry to 3.5% for glass. The much higher growth rate for the latter ties in with its role as supplier of glass containers to various other industries. No significant new process changes are foreseen. Electricity use per unit of physical output is forecast to decrease moderately in response to conservation/efficiency efforts similar to the trends witnessed during the last decade. Electricity demand for these three industries as a whole is expected to increase by an annual rate of 1.6%.

Food & beverage: Growth in this market is closely tied to population growth and changes in eating and drinking habits. Current estimates place production growth at just under 1% per annum over the forecast period. A moderate adoption of more electricity-intensive technologies (eg. microwave thawing, precooking) is expected to result in an annual growth of 1.2% in electricity demand.

Industrial chemicals: The prime players here are ammonia, chlorine, and ethylene. Expected production growth rates vary with ethylene enjoying the healthiest growth at 2.6% per annum over the entire forecast period. Membrane cell technology, which is less electricity-intensive than the current diaphragm cell, is expected to become the dominant chlorine production technology by the mid 1990s. No significant technological changes are expected for ammonia production. Similarly, ethylene production facilities already are highly efficient and minimal changes in electricity use per unit of output are expected. Taking the above into consideration, electricity demand for industrial chemicals is expected to increase by 1.7% per annum over the forecast period.

Iron & steel: In addition to exports, this industry's output is primarily geared to meeting demand from the auto manufacturing and construction industries. Production levels are expected to grow by 1.5% per annum until the turn of the century. Growth thereafter should stabilize at a modest 0.7%. The large integrated steel mills produce 85% of Ontario output, while the remaining 15% is produced by 5 mini-mills. Industry experts do not expect the minimills' share of production to increase beyond 20%. Currently, the use of electricity-intensive electric arc furnaces is limited to the mini-mills, with basic oxygen furnaces (BOFs) still playing the dominant role for integrated mills. The

further adoption of electric arc technology will be dictated by the cost and availability of scrap, relative capital and operating costs compared to BOFs and the demand for specialty steels. In addition, technological upgrades continue to make BOFs a very attractive option. The use of electricity-intensive plasma smelting to replace blast furnaces was considered to be as yet too developmental to be included in this forecast. New technologies for the finishing operations, such as continuous and strip casting, will substantially reduce electricity consumption. As a result of the above considerations, the present forecast proposes a growth rate of 1.3% per annum over the forecast period.

Mining, milling, smelting & refining: Ontario nickel producers are forecast to enjoy a modest growth in production of 1% per annum until the turn of the century, turning to an annual decrease of 1.4% when less developed countries will begin to gain market share. Copper production is expected to exhibit a similar growth trend. The decrease in copper production is related to the trend towards the use of substitute materials (eg. plastics for plumbing in the housing industry, and fiber-optics in telecommunications). Zinc, on the other hand, is expected to follow an annual growth of .5% over the forecast period. No major technological changes are expected to take place for either the actual mining or the processing stages. Combining this assumption with the poor product demand forecasts leads to little growth in electricity demand by this industry in the near term followed by actual decreases after the turn of the century. Electricity demand is forecast to decrease by an annual rate of 0.7% over the forecast period.

Pulp & paper: This industry is extremely export-oriented, and is facing continued strong competition from domestic as well as foreign suppliers. It is assumed that newsprint producers will take the necessary steps to remain competitive and will maintain a steady, but modest, annual growth of 0.8%. Growth in printing paper demand will be fuelled by increased service-sector activities. The prognosis for this product is quite optimistic with an annual growth of 3.2% forecasted. Increased competition will dwindle export pulp growth from 2.6% per annum during the early part of the forecast to 1.2% post 1992. By far, the most significant technology to look for here is the increased use of thermo-mechanical pulping (TMP). Electricity consumption per unit of output using the TMP process is approximately 20 - 30% higher than existing processes. TMP's technology share of newsprint pulping is expected to increase from a present level of 12% to 40% by the early 1990s and 100% by 2010. TMP is also expected to grow in fine paper production from a present level of 10% to 30% by the year 2010. Apart from pulping, there is increased focus on the introduction of new calendering technologies. It is estimated that these new technologies will require 20% more electricity per unit of output during the paper-making phase. The above considerations result in a forecasted annual growth of 2.1% in electricity demand.

(4) Transportation Sector

The transportation sector, although a large consumer of energy, accounts for only a small percentage of total electricity demand. Electricity use in transportation is composed almost entirely of the energy requirements of subways, streetcars and trolley buses. Given the expectation of increased ridership and the possibility of expansion of the subway and streetcar systems, growth in electricity demand is expected to occur at a slow to moderate pace over the 1987-2010 period. Neither railway electrification nor the large-scale introduction of electric automobiles is foreseen during this period.

The demand for other fuels in the sector is expected to increase at a moderate pace, driven by growth of the population and the economy. Given the outlook for relatively slow growth of real fossil fuel prices, vehicle efficiency improvements are unlikely to be large.

The 1987 End-Use Forecast

The final demand for electricity by sector is given below. The "Other" category refers to electricity use within the energy sector, such as oil refinery demand. Note that the residential sector is forecast to experience slower growth than either the commercial or industrial sectors. Over the period 1986 - 2010 the absolute growth will be 78.2 TW.h. The industrial sector is expected to contribute 29.7 TW.h to this growth while the commercial and residential sectors will contribute 25.5 TW.h and 21.6 TW.h respectively.

Table 2.3.2.3: End-Use Forecast (TW.h)

Year	Residential TW.h	Commercial TW.h	Industrial* TW.h	Transp.	Other	Total	Adjust ment** TW.h	Basic Energy Demand TW.h
1986 Actual	37.3	34.7	44.5	0.4	1.8	118.3	2.3	120.6
1987	38.5	35.2	44.9	0.4	1.8	120.6	2.6	123.2
1990	41.5	37.3	48.9	0.4	1.8	129.8	2.6	132.4
1995	46.9	42.3	55.9	0.4	1.9	147.4	2.8	150.2
2000	51.2	47.8	62.1	0.4	2.1	163.6	2.8	166.4
2005	55.2	54.3	68.1	0.5	2.2	180.3	2.8	183.1
2010	58.9	59.9	74.2	0.5	2.4	195.9	2.9	198.8

Electric Energy Growth Rates %

1986-2010	1.9	2.3	2.1	0.9	2.1
1987-1990	2.5	2.0	2.9	0.0	2.4
1987-2000	2.2	2.4	2.5	0.0	2.3
1987-2005	2.0	2.4	2.3	1.2	2.2
1987-2010	1.9	2.3	2.2	1.0	2.1

* Includes co-generated electricity

** Ontario Hydro losses less Ontario electricity not sold by Hydro, including co-generation and purchases from non-Hydro generators.

2.3.3 Recommended Forecast

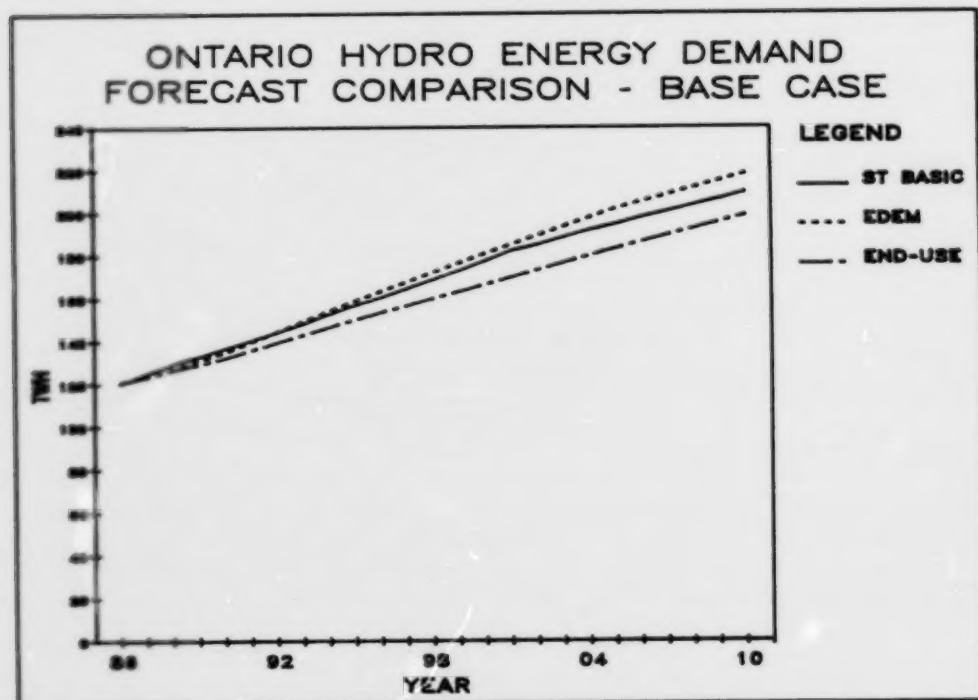
For this year's forecast, the end-use and EDEM models were tuned to estimates of energy demand and economic variables for 1987, using the 1987 forecasts as if they were already history. Then a baseline run was made with each model to simulate the most-likely forecast from the September 1987 Annual Economic Outlook. This produced the central forecast for each model which were compared. After this comparison, a decision was made as to what the load forecast should be. Adjustments were then made to each of the models in order to reflect required changes. The models now track the Basic Load Forecast so that the disaggregation available from the models, as required by certain users, is consistent with the official aggregate forecast.

Table 2.3.3: Summary of Forecasts

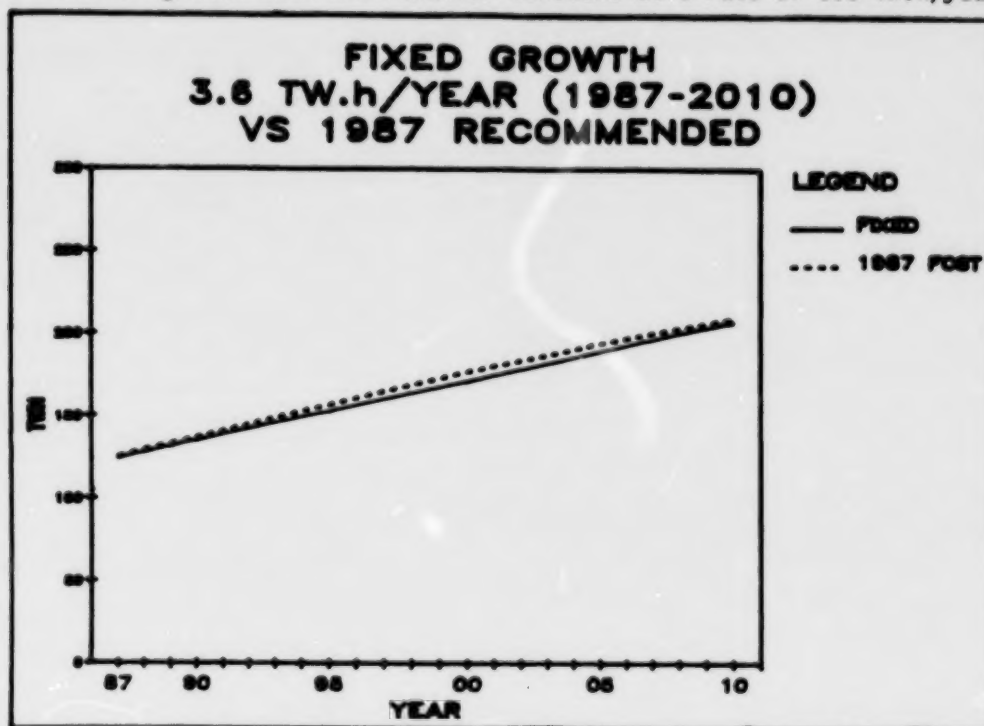
Ontario Hydro Basic Energy Demand Model Comparison (TW.h)			Official Load Forecast 871214 (TW.h)		
Year	EDEM*	End-Use*	Basic	Indirect Incentives	Primary
1987	126.2	123.2	125.2	0.0	125.2
1990	135.1	132.4	137.1	0.1	137.0
1995	158.7	150.2	157.0	1.5	155.5
2000	181.1	166.4	177.4	5.4	172.0
2005	201.7	183.1	194.5	6.8	187.7
2010	218.2	198.8	209.5	8.1	201.4
Growth Rates**					
1987-2000	2.8	2.3	2.7		2.5
1987-2005	2.6	2.2	2.5		2.3
1987-2010	2.4	2.1	2.3		2.1

* Not tuned to equal official forecast

** Average annual percent change



The average annual growth rate of the Basic Load Forecast, for the next 20 years, is projected to be less than it has been over the last 20 years, but the absolute annual growth rate has remained constant at a rate of 3.6 TW.h/year.



2.4 Results for Alternative Scenarios

The Economics and Forecasts Division prepares alternatives to the most-likely forecast of the economic environment. These alternatives are covered by three scenarios, each based on a consistent set of assumptions around which a corresponding forecast is prepared. These scenarios are Higher Productivity, Higher Inflation and Deflation scenarios.

The wide range of forecasts produced by the EDEM model under the three alternative scenarios gives some idea of the range of uncertainty of the forecast. Each one of these forecasts responds to changes in fossil fuel prices, but the electricity price forecast is maintained at the most likely scenario. As a result, these scenarios may not capture all of the structural changes that would occur in the energy market.

It is important to recognize that this uncertainty is as much a part of the load forecast as is the forecast itself. The load forecast represents the most-likely of a wide range of possible forecasts, and planners must take into account the high degree of uncertainty attached to any particular outcome.

EDEM Results - Alternative Scenarios

Table 2.4: Basic Load Forecast

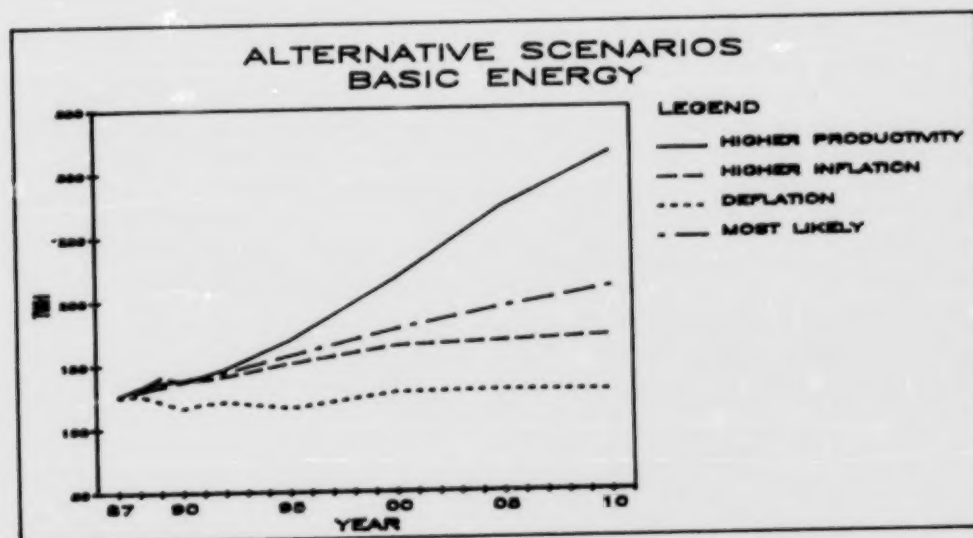
	Residential TW.h			Commercial TW.h			Industrial TW.h			Total Basic Energy TW.h		
	HP	I	D	HP	I	D	HP	I	D	HP	I	D
1987	34.4	34.4	34.4	43.2	43.2	42.9	47.3	47.4	46.5	126.3	126.5	125.2
1990	37.3	37.0	34.9	47.9	47.4	37.7	51.8	51.3	41.8	138.6	137.3	115.6
1995	43.8	38.8	39.4	58.8	52.0	32.0	62.4	56.7	41.9	168.8	150.9	115.6
2000	50.5	42.4	41.7	83.2	56.0	34.6	78.1	62.7	48.9	217.0	164.7	127.8
2005	53.4	43.7	41.1	116.6	55.1	34.5	96.3	65.4	51.1	273.0	168.0	129.3
2010	54.5	42.1	40.6	141.9	56.4	32.9	109.9	69.1	51.9	314.3	171.6	128.0

Growth Rates*

1987- 2000	3.0	1.6	1.5	5.2	2.0	-1.7	3.9	2.2	0.4	4.3	2.1	0.2
1987- 2005	2.5	1.3	1.0	5.7	1.4	-1.2	4.0	1.8	0.5	4.4	1.6	0.2
1987- 2010	2.0	0.9	0.7	5.3	1.2	-1.2	3.7	1.7	0.5	4.0	1.3	0.1

* Average annual per cent change.

HP = Higher Productivity
I = Higher Inflation
D = Deflation



The higher productivity scenario recognizes that a higher economic growth path than the Most Likely is physically possible, but it would require a different political and institutional climate than we are likely to get. Reducing government deficits would lower real interest rates, and would permit more capital investment to utilize the technological advances of the past decade. Freer trade (not necessarily a full-fledged free trade agreement; in fact, a series of sectoral agreements modelled on the auto pact would be preferable) would allow Canadian industry to operate on a larger scale and, therefore, increase productivity. There would be some transitional costs in moving to this scenario, and higher growth would not emerge until the 1990s.

The higher inflation scenario recognizes that key elements in the United States government have turned against the monetarist doctrine which brought down inflation in the early 1980s. In this scenario, the increasing ascendancy of the pro-growth group leads to a blunder in monetary policy which produces significantly higher inflation and resurrects inflationary price setting habits in the economy. It is assumed that there would not be sufficient political resolve to repeat the 1982 recession in order to reduce inflation once again. The increased financial risk in this higher inflation environment would inhibit capital investment and reduce the economic growth rate.

In the deflation scenario, the world-wide oversupply of basic commodities combined with increased protectionism in the United States and Japan lead to a severe world recession in the late 1980s. Lower activity inevitably aggravates the debt problem of the LDCs who find it difficult to maintain their exports and, therefore, cannot earn enough foreign exchange to make their interest payments. This results in an outright repudiation of their loans which, if not countered by Central Bank policy, could lead to bank failures. Government monetary policy errs in the opposite direction from the one described in the Higher Inflation scenario. Here, monetary policy would be too tight, keeping interest rates high. For Ontario, this would be exacerbated by the fact that the auto industry, whose construction activity has been a major stimulus to the economy in the past few years, will likely be suffering from excess capacity. During this extended depressed period, North American investment and technical progress would languish, enabling the developing countries to narrow further the gap between us and them.

2.5 Impact of Ontario Hydro's Marketing Activities

2.5.1 Introduction

As mentioned earlier, two load forecasts are presented. The first, called the Basic Load Forecast, has been discussed in the previous sections of this report. The second, called the Primary Load Forecast, is derived by subtracting from the Basic Load Forecast the net effect of Ontario Hydro Incentive Programs which could include: 1) changes in rate structure such as time-of-use rates, off-peak incentives, etc; and 2) financial incentives such as grants or loans, etc.

It is the Primary Load Forecast minus interruptible loads and Control Centre Controlled loads which is used by System Planning to derive their Planning Firm Load series.

The estimates for indirect incentives used to produce the short-term forecast early in 1986 were developed by a Working Group consisting of representatives from Marketing Branch, System Planning Division, and Economics and Forecasts Division. The data on indirect incentives are listed below. The resulting forecast is presented in two parts: programs which will result in efficiency

improvements, and the effect of introduction of a time-of-use structure for electricity rates.

The forecast does not yet have associated with it an uncertainty range. At best, it can be said to contribute to the total uncertainty in the load forecast.

2.5.2 The Forecast

The Efficiency Improvement programs include both the impact of demonstration projects and the impact of the actual programs themselves, once committed.

Table 2.5.2.1: December Peak MW Reduction

Year	Improvement Programs		Time-of-Use Rates		Total	
	Per Year	Cumulative	Per Year	Cumulative	Per Year	Cumulative
1988	1	1	0	0	1	1
1989	4	5	80	80	84	85
1990	7	12	80	160	87	172
1991	13	25	80	240	93	265
1992	25	50	165	405	190	455
1993	40	90	165	570	205	660
1994	80	170	140	710	220	880
1995	120	290	115	825	235	1115
1996	160	450	60	885	220	1335
1997	170	620	25	910	195	1530
1998	160	780	25	935	185	1715
1999	120	900	30	965	150	1865
2000	100	1000	35	1000	135	2000
2001	50	1050	35	1035	85	2085
2002	50	1100	30	1065	80	2165
2003	50	1150	25	1090	75	2240
2004	50	1200	25	1115	75	2315
2005	50	1250	25	1140	75	2390
2006	50	1300	25	1165	75	2465
2007	50	1350	25	1190	75	2540
2008	50	1400	25	1215	75	2615
2009	50	1450	25	1240	75	2690
2010	50	1500	25	1265	75	2765

In order to translate the peak MW reduction caused by efficiency improvement programs into an annual TW.h reduction, estimates of the breakdown of the programs by sector and the load factors of the programs by sector are necessary. The estimates of the breakdown by sector are 1/3 in residential, 5/12 in commercial and 1/4 in industrial. The estimates of the load factors by sector are 34% for the residential sector, 75% for the commercial sector and 75% for the industrial sector. Having determined these estimates, the annual TW.h reductions are forecast.

Table 2.5.2.2: Annual TW.h Reduction

Efficiency Improvement Programs

<u>Year</u>	<u>Per Year</u>	<u>Cumulative</u>
1988	.005	.005
1989	.022	.027
1990	.038	.065
1991	.069	.134
1992	.135	.269
1993	.215	.484
1994	.429	.913
1995	.645	1.558
1996	.866	2.424
1997	.907	3.331
1998	.860	4.191
1999	.645	4.836
2000	.552	5.388
2001	.253	5.641
2002	.269	5.910
2003	.269	6.179
2004	.286	6.465
2005	.251	6.716
2006	.269	6.985
2007	.268	7.253
2008	.290	7.543
2009	.248	7.791
2010	.268	8.059

In the case of time-of-use rates it is assumed that the impact is purely one of load shifting and that there will be no increase or reduction in annual TW.h.

2.5.3 Policy Assumptions Embedded in the Forecast

(1) Efficiency Improvement Programs

It is assumed there is a corporate commitment to carry out actions along the lines of those contained in a preliminary report on a development plan for strategic conservation. This working paper is illustrative of the resources necessary, although they are not yet fully committed. It involves the cumulative expenditure of a net \$1 billion (1985 dollars) by the year 2000. This expenditure includes both manpower and capital costs. The short-term figures, to 1992, reflect Marketing's approved 1987 Business Plan.

(2) Peak Load Shifting

For this forecast, it was assumed that time-of-use rates will be implemented in 1989, although the precise nature of the rate structure proposal was not available at the time the forecast was made. These rates will initially be offered to direct customers and municipalities. The equivalent of a 2:1 energy price ratio at the end-use level has been determined to be compatible with system planning's estimate of a 1000 MW opportunity on the system for load shifting. It should be stressed that the 1000 MW can only be viewed as preliminary estimate, since there is no guarantee that this level can in actuality be achieved.

TABLE A

COMPARISON OF TOTAL SYSTEM DEMANDS WITH EARLIER FORECASTSONTARIO PRIMARY DEMAND20-MINUTE WINTER PEAK DEMAND - Megawatts

Winter	Actual	FORECAST MADE IN						
		1981	1982	1983	1984	1985	1986	1987
1980/81	17189							
1981/82	18124	17461						
1982/83	17578	18012	17953					
1983/84	18896	18768	18650	18227				
1984/85	19390	19449	19370	18819	19438			
1985/86	20668	20204	20042	19404	19915	19846		
1986/87	20609	20943	20730	20035	20531	20386	21222	
1987/88	22593	21723	21465	20603	21100	20917	21817	22018
1988/89		22546	22214	21121	21721	21510	22520	22676
1989/90		23424	22987	21636	22198	22116	23065	23245
1990/91		24336	23783	22018	22895	22683	23558	23898
1991/92		25188	24577	22409	23523	23312	23995	24359
1992/93		26065	25385	22851	24116	24029	24364	24892
1993/94		26917	26172	23352	24689	24775	24788	25441
1994/95		27690	26979	23927	25233	25545	25279	25936
1995/96		28393	27760	24545	25859	26029	25766	26291
1996/97		29072	28475	25161	26524	26660	26264	26785

ANNUAL ENERGY DEMAND - Terawatt hours

Year	Actual	FORECAST MADE IN						
		1981	1982	1983	1984	1985	1986	1987
1980	100.2							
1981	101.7	102.4						
1982	100.8	105.7	104.8					
1983	106.1	109.1	108.1	103.3				
1984	112.3	113.2	112.5	109.0	111.3			
1985	116.0	117.4	116.3	112.6	114.5	115.1		
1986	120.6	121.9	120.1	116.3	117.2	117.7	121.0	
1987	126.5	126.4	124.4	119.9	120.7	121.1	125.0	125.2
1988		131.5	129.0	123.5	124.0	124.4	129.0	129.7
1989		136.3	133.2	126.2	127.0	127.4	132.1	133.2
1990		141.6	137.8	129.3	129.8	130.9	135.0	137.0
1991		146.6	142.4	131.6	133.9	134.2	137.9	140.5
1992		152.1	147.9	134.3	137.5	138.0	142.3	144.3
1993		156.7	152.1	136.6	141.0	142.2	145.5	147.9
1994		161.2	156.8	139.6	144.4	146.6	148.8	151.9
1995		165.3	161.4	143.0	147.5	151.2	152.3	155.5
1996		169.3	165.6	146.7	151.2	154.1	155.7	158.0

TABLE A1

COMPARISON OF 20-MINUTE WINTER PEAK DEMANDS WITH EARLIER FORECASTS

EAST SYSTEM - ONTARIO PRIMARY DEMAND
Megawatts

Winter	Actual	FORECAST MADE IN						
		1981	1982	1983	1984	1985	1986	1987
1980/81	16440							
1981/82	17335	16605						
1982/83	16793	17130	17103					
1983/84	18009	17869	17756	17404				
1984/85	18525	18507	18412	17975	18553			
1985/86	19711	19205	19056	18537	18989	18905		
1986/87	19679	19911	19722	19112	19572	19445	20261	
1987/88	21615	20653	20423	19661	20127	19953	20834	21020
1988/89		21432	21133	20155	20738	20506	21518	21675
1989/90		22261	21868	20646	21194	21096	22027	22215
1990/91		23126	22623	21011	21860	21637	22488	22867
1991/92		23936	23370	21384	22459	22237	22930	23324
1992/93		24769	24138	21806	23025	22921	23279	23833
1993/94		25578	24886	22284	23572	23632	23682	24356
1994/95		26312	25653	22833	24091	24367	24150	24829
1995/96		26980	26395	23422	24689	24829	24610	25166
1996/97		27625	27075	24010	25324	25430	25072	25638

WEST SYSTEM - ONTARIO PRIMARY DEMAND
Megawatts

Winter	Actual	FORECAST MADE IN						
		1981	1982	1983	1984	1985	1986	1987
1980/81	875							
1981/82	878	891						
1982/83	870	918	895					
1983/84	932	934	943	900				
1984/85	961	980	1002	922	955			
1985/86	1012	1035	1032	948	998	995		
1986/87	1015	1071	1056	1008	1033	995	977	
1987/88	1035	1111	1092	1030	1048	1019	1020	1044
1988/89		1156	1133	1056	1060	1062	1049	1049
1989/90		1206	1172	1082	1083	1078	1075	1084
1990/91		1250	1215	1101	1117	1106	1125	1085
1991/92		1293	1260	1120	1148	1136	1152	1092
1992/93		1338	1301	1142	1177	1171	1153	1111
1993/94		1382	1341	1167	1205	1208	1174	1138
1994/95		1421	1382	1196	1232	1245	1198	1163
1995/96		1458	1422	1227	1262	1269	1226	1187
1996/97		1493	1458	1258	1295	1300	1251	1205

TABLE B

COMPARISON OF 1987 AND 1986 FORECASTS

Average Monthly 1-Hour Peak - Megawatts

1987 Forecast (871214)

	<u>Regional Estimates</u>	<u>Unallocated Load</u>	<u>Sum of Customer Loads</u>	<u>Indirect Incentives</u>	<u>Net Diversity & Loss</u>	<u>Primary Demand</u>
1987	18879	+18	18897	0	-363	18534
1988	19599	-58	19541	-1	-374	19166
1989	20363	-215	20148	-46	-385	19717
1990	21078	-341	20737	-131	-397	20209
1991	21811	-463	21348	-220	-461	20667

1986 Forecast (861208)

1987	19058	-228	18830	0	-413	18417
1988	19777	-372	19405	-13	-425	18967
1989	20548	-541	20007	-51	-469	19487
1990	21281	-701	20580	-128	-510	19942
1991	22014	-892	21122	-230	-522	20370

Difference between Forecasts (1987 Forecast - 1986 Forecast)

1987	-179	246	67	0	50	117
1988	-178	314	136	12	51	199
1989	-185	326	141	5	84	230
1990	-203	360	157	-3	113	267
1991	-203	429	226	10	61	297

TABLE C

LOAD FORECAST REPORT NO. 871214
ONTARIO PRIMARY DEMANDS - TOTAL SYSTEMS

Year	20 Min	Annual Energy		Load Factor
	Annual			
	Peak MW	MW.h	Avg MW	
1945	1,771.3	10,334,944.6	1,179.8	66.6
1946	2,036.1	10,575,379.3	1,207.2	59.3
1947	2,262.2	12,495,821.2	1,426.5	63.1
1948	2,393.0	12,991,064.4	1,478.9	61.8
1949	2,443.7	13,511,035.9	1,542.4	63.1
1950	2,753.1	15,175,583.7	1,732.4	62.9
1951	3,063.1	17,241,303.9	1,968.1	64.3
1952	3,247.7	18,401,371.7	2,094.8	64.5
1953	3,442.8	19,590,139.1	2,236.3	65.0
1954	3,655.7	20,471,343.9	2,336.8	63.9
1955	4,183.2	22,877,271.2	2,611.4	62.4
1956	4,468.5	25,135,134.1	2,861.4	64.0
1957	4,737.6	27,002,762.0	3,082.4	65.1
1958	5,093.1	27,979,394.9	3,193.8	62.7
1959	5,510.6	31,143,172.8	3,555.0	64.5
1960	5,699.8	32,319,968.2	3,679.4	64.6
1961	5,902.9	33,569,282.4	3,831.9	64.9
1962	6,247.0	35,488,962.2	4,051.1	64.9
1963	6,750.6	37,288,964.1	4,256.5	63.1
1964	7,163.9	40,305,468.3	4,588.5	64.1
1965	7,818.4	43,511,759.8	4,967.1	63.5
1966	8,565.6	48,054,384.4	5,485.7	64.0
1967	8,963.8	51,355,505.0	5,862.5	65.4
1968	9,994.4	55,788,374.7	6,351.1	63.5
1969	10,555.4	59,424,443.4	6,783.6	64.3
1970	11,288.7	64,287,605.7	7,338.8	65.0
1971	11,534.5	68,132,582.0	7,777.7	67.4
1972	12,738.8	73,495,941.4	8,367.2	65.7
1973	13,605.4	78,162,478.1	8,922.6	65.6
1974	13,538.1	82,695,005.7	9,440.1	69.7
1975	14,512.5	84,220,853.4	9,614.2	66.2
1976	15,895.3	90,851,705.2	10,343.0	65.1
1977	15,901.1	92,853,681.9	10,599.7	66.7
1978	16,246.7	95,371,714.5	10,887.2	67.0
1979	16,364.7	98,126,082.3	11,201.6	68.4
1980	16,807.8	100,172,734.9	11,404.0	67.8
1981	17,189.0	101,658,168.0	11,604.8	67.5
1982	18,123.6	100,835,597.9	11,510.9	63.5
1983	18,791.5	106,071,164.8	12,108.6	64.4
1984	18,896.0	112,293,482.0	12,783.8	67.6
1985	20,473.0	116,048,994.0	13,247.6	64.7
1986	20,668.0	120,573,918.0	13,764.1	66.6
1987	20,524.0	126,455,099.0	14,435.5	70.3

LOAD FORECAST ESTIMATE 871214

1987	21,492.0	125,240,000.0	14,296.8	66.5
1988	22,245.0	129,718,600.0	14,767.6	66.4
1989	22,874.0	133,237,000.0	15,209.7	66.5
1990	23,466.0	136,988,900.0	15,638.0	66.6
1991	23,952.0	140,485,900.0	16,037.2	67.0
1992	24,430.0	144,257,000.0	16,422.7	67.2
1993	24,961.0	147,911,700.0	16,884.9	67.6
1994	25,504.0	151,899,500.0	17,340.1	68.0
1995	25,996.0	155,467,500.0	17,747.4	68.3
1996	26,370.0	158,043,900.0	18,041.5	68.4

1-HR PEAK

REPORT NO. 871214

TABLE 1 - E+M

TOTAL SYSTEM
CUSTOMERS LOADS AND PRIMARY DEMANDS

	MUNICIPAL		RETAIL		DIRECT	
	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW
1987						
JAN	14330	10705	3809	2617	2950	2386
FEB	13808	10485	3572	2453	2956	2412
MAR	13537	10096	3513	2282	2982	2408
APR	12149	8897	2860	1826	2988	2405
MAY	11655	8449	2606	1590	2892	2304
JUNE	12296	8563	2280	1471	3053	2426
JULY	12569	8699	2258	1481	2927	2148
AUG	12555	8846	2329	1524	3012	2361
SEPT	12335	8604	2439	1537	3105	2436
OCT	11918	8789	2810	1722	3085	2474
NOV	13461	9828	3273	2123	3088	2496
DEC	14485	10408	3814	2502	3064	2395
1988						
JAN	14887	11120	3974	2728	3089	2498
FEB	14275	10837	3717	2550	3076	2511
MAR	14015	10449	3669	2380	3102	2517
APR	12601	9224	2981	1900	3085	2469
MAY	12103	8770	2716	1655	3027	2413
JUNE	12708	8844	2378	1534	3007	2379
JULY	13043	9023	2352	1542	2949	2140
AUG	12990	9147	2425	1586	3013	2340
SEPT	12750	8890	2544	1601	3015	2336
OCT	12373	9121	2920	1788	3085	2461
NOV	13994	10214	3406	2205	3104	2500
DEC	15037	10801	3966	2599	3105	2420
1989						
JAN						
DEC	15480	11114	4109	2691	3147	2514
DECEMBER						
1990	15936	11437	4256	2786	3131	2560
1991	16395	11762	4408	2883	3079	2583
1992	16718	12080	4531	2979	3107	2608

1-HR PEAK

REPORT NO. 871214

TABLE 1 - E+W

TOTAL SYSTEM

CUSTOMERS LOADS AND PRIMARY DEMANDS

	SUM CUSTOMERS LOADS		DIVERSITY AND/OR LOSSES		PRIMARY DEMAND IN TERMS OF GENERATION		LOAD FACTOR %
	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	
1987							
JAN	21988	15708	-147	710	20941	16418	78.4
FEB	20337	15351	-226	703	20111	16054	79.8
MAR	20031	14785	-155	658	19876	15443	77.7
APR	17997	13127	-390	580	17607	13707	77.8
MAY	17153	12342	-531	583	16622	12925	77.8
JUNE	17630	12460	-588	551	17042	13011	76.3
JULY	17754	12327	-539	627	17215	12954	75.2
AUG	17896	12731	-497	613	17399	13344	76.7
SEPT	17880	12577	-730	603	17150	13180	76.9
OCT	17813	12985	-424	566	17389	13551	77.9
NOV	19822	14447	-81	629	19741	15076	76.4
DEC	21362	15306	-48	693	21314	15999	75.1
1988							
JAN	21950	16346	-152	738	21798	17084	78.4
FEB	21068	15898	-233	728	20835	16626	79.8
MAR	20787	15346	-161	683	20626	16029	77.7
APR	18667	13593	-403	600	18264	14193	77.7
MAY	17846	12838	-551	607	17295	13445	77.7
JUNE	18093	12757	-603	565	17490	13322	76.2
JULY	18344	12705	-557	645	17787	13350	75.1
AUG	18427	13073	-511	629	17916	13702	76.5
SEPT	18309	12827	-748	615	17561	13442	76.5
OCT	18378	13370	-438	582	17940	13952	77.8
NOV	20503	14919	-82	649	20421	15568	76.2
DEC	22108	15820	-48	716	22060	16536	75.0
1989							
JAN					22449	17585	78.3
DEC	22735	16319	-50	739	22685	17058	75.2
DECEMBER							
1990	23323	16783	-52	761	23271	17544	75.4
1991	23881	17228	-129	715	23752	17943	75.5
1992	24357	17667	-132	735	24225	18402	76.0
1993					24750	18929	76.5
1994					25287	19423	76.8
1995					25773	19865	77.1
1996					26142	20181	77.2

20-MIN

REPORT NO. 871214

TABLE 1 - E+W

TOTAL SYSTEM

CUSTOMERS LOADS AND PRIMARY DEMANDS

	SUM CUSTOMERS LOADS		DIVERSITY AND/OR LOSSES		PRIMARY DEMAND IN TERMS OF GENERATION		LOAD FACTOR %
	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	
1987							
JAN	21303	15708	-149	710	21154	16418	77.6
FEB	20501	15351	-227	703	20274	16054	79.2
MAR	20181	14785	-156	658	20025	15443	77.1
APR	18142	13127	-393	580	17749	13707	77.2
MAY	17299	12342	-534	583	16765	12925	77.1
JUNE	17770	12460	-592	551	17178	13011	75.7
JULY	17874	12327	-543	627	17331	12954	74.7
AUG	18023	12731	-500	613	17523	13344	76.2
SEPT	18025	12577	-735	603	17290	13180	76.2
OCT	17989	12985	-429	566	17560	13551	77.2
NOV	20005	14447	-80	629	19925	15076	75.7
DEC	21540	15306	-48	693	21492	15999	74.4
1988							
JAN	22172	16346	-154	738	22018	17084	77.6
FEB	21239	15898	-234	728	21005	16626	79.2
MAR	20942	15346	-162	683	20780	16029	77.1
APR	18817	13593	-406	600	18411	14193	77.1
MAY	17998	12838	-556	607	17442	13445	77.1
JUNE	18238	12757	-607	565	17631	13322	75.6
JULY	18468	12705	-561	645	17907	13350	74.6
AUG	18558	13073	-514	629	18044	13702	75.9
SEPT	18459	12827	-754	615	17705	13442	75.9
OCT	18561	13370	-443	582	18118	13952	77.0
NOV	20694	14919	-83	649	20611	15568	75.5
DEC	22293	15820	-48	716	22245	16536	74.3
1989							
JAN					22676	17585	77.5
DEC	22925	16319	-51	739	22874	17058	74.6
DECEMBER							
1990	23518	16783	-52	761	23466	17544	74.8
1991	24082	17228	-130	715	23952	17943	74.9
1992	24563	17667	-133	735	24430	18402	75.3
1993					24961	18929	75.8
1994					25504	19423	76.2
1995					25996	19865	76.4
1996					26370	20181	76.5

1-HR PEAK

REPORT NO. 871214

TABLE 1 - ES

EAST SYSTEM
ONTARIO PRIMARY DEMAND
25 AND 60 HERTZ

1987	EAST SYSTEM 60 HERTZ		NIAGARA 25 HERTZ		NORTHEASTERN 25 HERTZ		INTER- NETWORK DIVER- SITY	EAST SYSTEM TOTAL	
	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW		PEAK MW	PRIMARY ENERGY AV MW
JAN	19887	15488	85	61	39	27	-30	19981	15576
FEB	19114	15145	85	62	36	26	-30	19205	15233
MAR	18859	14581	85	62	36	25	-30	18950	14668
APR	16714	12876	85	61	36	25	-30	16805	12962
MAY	15715	12114	85	61	37	26	-30	15807	12201
JUNE	16139	12205	85	61	37	25	-30	16231	12291
JULY	16355	12181	84	59	36	25	-30	16445	12265
AUG	16516	12543	85	60	36	25	-30	16607	12628
SEPT	16268	12384	85	60	37	25	-30	16360	12469
OCT	16418	12704	86	61	37	25	-30	16511	12790
NOV	18694	14175	84	60	37	26	-30	18785	14261
DEC	20235	15874	83	59	37	26	-30	20325	15159
1988									
JAN	20719	16129	83	59	34	25	-30	20806	16213
FEB	19816	15690	83	60	34	25	-30	19903	15775
MAR	19592	15135	83	59	34	25	-30	19679	15219
APR	17355	13347	83	59	34	25	-30	17442	13431
MAY	16369	12618	83	59	36	25	-30	16458	12702
JUNE	16571	12502	83	59	36	25	-30	16660	12586
JULY	16906	12561	82	56	32	22	-30	16990	12639
AUG	17025	12897	83	57	32	22	-30	17110	12976
SEPT	16666	12636	83	56	32	22	-30	16751	12714
OCT	16967	13105	83	59	32	22	-30	17052	13186
NOV	19367	14668	83	59	32	23	-30	19452	14742
DEC	20974	15605	83	59	31	22	-30	21058	15686
1989									
JAN	21370	16629	83	59	31	23	-30	21454	16711
DEC	21560	16884	90	62	30	21	-30	21650	16167
DECEMBER									
1990	22138	16551	99	68	30	21	-30	22237	16640
1991	22613	16933	99	68	30	21	-30	22712	17022
1992	23070	17372	98	68	30	21	-30	23168	17461
1993	23564	17873	98	68	30	21	-30	23662	17962
1994	24076	18342	98	68	30	21	-30	24174	18431
1995	24538	18761	98	68	30	21	-30	24636	18850
1996	24892	19061	98	68	30	21	-30	24990	19150

20-MIN

REPORT NO. 871214

TABLE 1 - ES

EAST SYSTEM

ONTARIO PRIMARY DEMAND

25 AND 60 HERTZ

	EAST SYSTEM 60 HERTZ		NIAGARA 25 HERTZ		NORTHEASTERN 25 HERTZ		INTER- NETWORK DIVER- SITY	EAST SYSTEM TOTAL PRIMARY	
	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW		PEAK MW	ENERGY AV MW
1987									
JAN	20094	15488	85	61	39	27	-30	20188	15576
FEB	19272	15145	86	62	36	26	-30	19364	15233
MAR	19003	14581	86	62	36	25	-30	19095	14668
APR	16850	12876	86	61	36	25	-30	16942	12962
MAY	15852	12114	85	61	37	26	-30	15944	12201
JUNE	16270	12205	86	61	37	25	-30	16363	12291
JULY	16467	12181	85	59	36	25	-30	16558	12265
AUG	16636	12543	85	60	36	25	-30	16727	12628
SEPT	16402	12384	86	60	37	25	-30	16495	12469
OCT	16585	12704	86	61	37	25	-30	16678	12790
NOV	18872	14175	85	60	37	26	-30	18964	14261
DEC	20407	15074	84	59	37	26	-30	20498	15159
1988									
JAN	20932	16129	84	59	34	25	-30	21020	16213
FEB	19981	15690	84	60	34	25	-30	20069	15775
MAR	19740	15135	84	59	34	25	-30	19828	15219
APR	17497	13347	84	59	34	25	-30	17585	13431
MAY	16512	12618	83	59	36	25	-30	16601	12702
JUNE	16707	12502	84	59	36	25	-30	16797	12586
JULY	17023	12561	83	56	32	22	-30	17108	12639
AUG	17149	12897	83	57	32	22	-30	17234	12976
SEPT	16806	12636	83	56	32	22	-30	16891	12714
OCT	17140	13105	84	59	32	22	-30	17226	13186
NOV	19553	14660	83	59	32	23	-30	19638	14742
DEC	21153	15605	84	59	31	22	-30	21238	15686
1989									
JAN	21591	16629	83	59	31	23	-30	21675	16711
DEC	21744	16084	90	62	30	21	-30	21834	16167
DECEMBER									
1990	22327	16551	99	68	30	21	-30	22426	16640
1991	22807	16933	99	68	30	21	-30	22906	17022
1992	23268	17372	99	68	30	21	-30	23367	17461
1993	23768	17873	99	68	30	21	-30	23867	17962
1994	24286	18342	99	68	30	21	-30	24385	18431
1995	24753	18761	99	68	30	21	-30	24852	18850
1996	25111	19061	99	68	30	21	-30	25210	19150

1-HR PEAK

REPORT NO. 871214

TABLE 2 - ES

EAST SYSTEM

CUSTOMERS LOADS AND PRIMARY DEMANDS

	MUNICIPAL		RETAIL		DIRECT	
	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW
1987						
JAN	14022	10486	3608	2474	2431	1946
FEB	13521	10288	3378	2318	2434	1955
MAR	13262	9910	3337	2163	2454	1968
APR	11917	8736	2718	1733	2459	1949
MAY	11434	8295	2467	1503	2361	1854
JUNE	12098	8422	2155	1391	2521	1961
JULY	12374	8562	2145	1405	2404	1704
AUG	12358	8711	2212	1446	2479	1898
SEPT	12127	8466	2309	1455	2582	1988
OCT	11687	8624	2662	1629	2553	2009
NOV	13178	9629	3098	2005	2556	2029
DEC	14166	10182	3622	2369	2532	1956
1988						
JAN	14574	10897	3762	2577	2553	2042
FEB	13982	10637	3515	2409	2539	2034
MAR	13735	10259	3486	2256	2564	2053
APR	12366	9061	2833	1804	2544	2002
MAY	11879	8614	2571	1565	2482	1951
JUNE	12506	8701	2248	1451	2464	1905
JULY	12844	8884	2235	1464	2406	1680
AUG	12788	9009	2303	1505	2473	1874
SEPT	12538	8749	2408	1516	2479	1877
OCT	12138	8954	2766	1692	2552	1997
NOV	13706	10011	3223	2082	2572	2031
DEC	14713	10571	3767	2460	2573	1981
1989						
JAN						
DEC	15150	10880	3906	2550	2589	2042
DECEMBER						
1990	15600	11199	4048	2641	2583	2084
1991	16053	11520	4193	2734	2535	2099
1992	16374	11834	4313	2825	2554	2113

1-HR PEAK

REPORT NO. 871214

TABLE 2 - ES

EAST SYSTEM

CUSTOMERS LOADS AND PRIMARY DEMANDS

	SUM CUSTOMERS LOADS		DIVERSITY AND/OR LOSSES		PRIMARY DEMAND IN TERMS OF GENERATION		LOAD FACTOR %
	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	
1987							
JAN	20161	14907	-80	669	19981	15576	78.0
FEB	19333	14561	-128	672	19205	15233	79.3
MAR	19053	14040	-103	628	19950	14668	77.4
APR	17095	12418	-290	544	16805	12962	77.1
MAY	16262	11652	-455	549	15807	12201	77.2
JUNE	16774	11774	-543	517	16231	12291	75.7
JULY	16923	11672	-478	593	16445	12265	74.6
AUG	17048	12056	-441	572	16607	12628	76.0
SEPT	17018	11909	-658	560	16360	12469	76.2
OCT	16902	12263	-391	527	16511	12790	77.5
NOV	18832	13663	-47	598	18785	14261	75.9
DEC	20320	14508	5	651	20325	15159	74.6
1988							
JAN	20889	15516	-83	697	20806	16213	77.9
FEB	20036	15079	-133	696	19903	15775	79.3
MAR	19785	14568	-106	651	19679	15219	77.3
APR	17743	12867	-301	564	17442	13431	77.0
MAY	16932	12130	-474	572	16458	12702	77.2
JUNE	17218	12057	-558	529	16660	12586	75.5
JULY	17484	12027	-494	612	16990	12639	74.4
AUG	17565	12388	-455	588	17110	12976	75.8
SEPT	17425	12143	-674	571	16751	12714	75.9
OCT	17456	12642	-404	544	17052	13186	77.3
NOV	19501	14125	-49	617	19452	14742	75.8
DEC	21053	15012	5	674	21058	15686	74.5
1989							
JAN					21454	16711	77.9
DEC	21644	15472	6	695	21650	16167	74.7
DECEMBER							
1990	22231	15924	6	716	22237	16640	74.8
1991	22782	16352	-70	670	22712	17022	74.9
1992	23240	16773	-72	688	23168	17461	75.4
1993					23662	17962	75.9
1994					24174	18431	76.2
1995					24636	18850	76.5
1996					24990	19150	76.6

1-HR PEAK

REPORT NO. 871214

TABLE 3 - ES

EAST SYSTEM

60 HERTZ NETWORK

	SUM CUSTOMERS LOADS		DIVERSITY AND/OR LOSSES		PRIMARY DEMAND IN TERMS OF GENERATION		LOAD FACTOR %
	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	
1987							
JAN	19960	14839	-73	649	19887	15488	77.9
FEB	19234	14494	-120	651	19114	15145	79.2
MAR	18954	13973	-95	608	18859	14581	77.3
APR	16996	12352	-282	524	16714	12876	77.0
MAY	16162	11585	-447	529	15715	12114	77.1
JUNE	16675	11708	-536	497	16139	12205	75.6
JULY	16825	11608	-470	573	16355	12181	74.5
AUG	16950	11991	-434	552	16516	12543	75.9
SEPT	16918	11844	-650	540	16268	12384	76.1
OCT	16801	12196	-383	508	16418	12704	77.4
NOV	18733	13597	-39	578	18694	14175	75.8
DEC	20222	14443	13	631	20235	15074	74.5
1988							
JAN	20793	15452	-74	677	20719	16129	77.8
FEB	19940	15015	-124	675	19816	15690	79.2
MAR	19688	14503	-96	632	19592	15135	77.3
APR	17647	12803	-292	544	17355	13347	76.9
MAY	16835	12066	-466	552	16369	12618	77.1
JUNE	17121	11993	-550	509	16571	12502	75.4
JULY	17391	11967	-485	594	16906	12561	74.3
AUG	17471	12328	-446	569	17025	12897	75.8
SEPT	17331	12083	-665	553	16666	12636	75.8
OCT	17363	12580	-396	525	16967	13105	77.2
NOV	19407	14063	-40	597	19367	14660	75.7
DEC	20960	14951	14	654	20974	15605	74.4
1989							
JAN					21370	16629	77.8
DEC	21547	15408	13	676	21560	16084	74.6
DECEMBER							
1990	22126	15856	12	695	22138	16551	74.8
1991	22678	16283	-65	650	22613	16933	74.9
1992	23136	16705	-66	667	23070	17372	75.3
1993					23564	17873	75.8
1994					24076	18342	76.2
1995					24538	18761	76.5
1996					24892	19061	76.6

1-HR PEAK

REPORT NO. 871214

TABLE 4 - ES

EAST SYSTEM - NIAGARA

25 HERTZ NETWORK

	SUM CUSTOMERS LOADS		DIVERSITY AND/OR LOSSES		PRIMARY DEMAND IN TERMS OF GENERATION		LOAD FACTOR %
	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	
1987							
JAN	69	47	16	14	85	61	71.8
FEB	69	48	16	14	85	62	72.9
MAR	69	48	16	14	85	62	72.9
APR	69	47	16	14	85	61	71.8
MAY	69	47	16	14	85	61	71.8
JUNE	69	47	16	14	85	61	71.8
JULY	68	45	16	14	84	59	70.2
AUG	69	46	16	14	85	60	70.6
SEPT	69	46	16	14	85	60	70.6
OCT	70	47	16	14	86	61	70.9
NOV	68	46	16	14	84	60	71.4
DEC	67	45	16	14	83	59	71.1
1988							
JAN	67	45	16	14	83	59	71.1
FEB	67	46	16	14	83	60	72.3
MAR	67	45	16	14	83	59	71.1
APR	67	45	16	14	83	59	71.1
MAY	67	45	16	14	83	59	71.1
JUNE	67	45	16	14	83	59	71.1
JULY	66	43	16	13	82	56	68.3
AUG	67	44	16	13	83	57	68.7
SEPT	67	43	16	13	83	56	67.5
OCT	67	45	16	14	83	59	71.1
NOV	67	45	16	14	83	59	71.1
DEC	67	45	16	14	83	59	71.1
1989							
JAN					83	59	71.1
DEC	73	48	17	14	90	62	68.9
DECEMBER							
1990	80	52	19	16	99	68	68.7
1991	80	52	19	16	99	68	68.7
1992	79	52	19	16	98	68	69.4
1993					98	68	69.4
1994					98	68	69.4
1995					98	68	69.4
1996					98	68	69.4

1-HR PEAK

REPORT NO. 871214

TABLE 5 - ES

EAST SYSTEM -NORTHEASTERN REGION

25 HERTZ NETWORK

	SUM CUSTOMERS LOADS		DIVERSITY AND/OR LOSSES		PRIMARY DEMAND IN TERMS OF GENERATION		LOAD FACTOR %
	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	
1987							
JAN	33	21	6	6	39	27	69.2
FEB	30	20	6	6	36	26	72.2
MAR	30	19	6	6	36	25	69.4
APR	30	19	6	6	36	25	69.4
MAY	31	20	6	6	37	26	70.3
JUNE	31	19	6	6	37	25	67.6
JULY	30	19	6	6	36	25	69.4
AUG	30	19	6	6	36	25	69.4
SEPT	31	19	6	6	37	25	67.6
OCT	31	19	6	6	37	25	67.6
NOV	31	20	6	6	37	26	70.3
DEC	31	20	6	6	37	26	70.3
1988							
JAN	29	19	5	6	34	25	73.5
FEB	29	19	5	6	34	25	73.5
MAR	29	19	5	6	34	25	73.5
APR	29	19	5	6	34	25	73.5
MAY	30	19	6	6	36	25	69.4
JUNE	30	19	6	6	36	25	69.4
JULY	27	17	5	5	32	22	68.8
AUG	27	17	5	5	32	22	68.8
SEPT	27	17	5	5	32	22	68.8
OCT	27	17	5	5	32	22	68.8
NOV	27	18	5	5	32	23	71.9
DEC	26	17	5	5	31	22	71.0
1989							
JAN					31	23	74.2
DEC	25	16	5	5	30	21	70.0
DECEMBER							
1990	25	16	5	5	30	21	70.0
1991	25	16	5	5	30	21	70.0
1992	25	16	5	5	30	21	70.0
1993					30	21	70.0
1994					30	21	70.0
1995					30	21	70.0
1996					30	21	70.0

1-HR PEAK

REPORT NO. 871214

TABLE 6 - ES

EAST SYSTEM

SUM OF CUSTOMERS LOADS BY REGION

	CENTRAL		WESTERN		EASTERN	
	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW
1987						
JAN	9729	7275	4041	3031	3072	2194
FEB	9374	7141	3871	2961	2990	2142
MAR	9238	6918	3867	2891	2897	2011
APR	8367	6170	3621	2653	2459	1698
MAY	8072	5897	3490	2550	2255	1539
JUNE	8551	5980	3697	2619	2193	1510
JULY	8757	6036	3766	2668	2201	1498
AUG	8749	6170	3826	2737	2208	1516
SEPT	8602	6008	3779	2654	2207	1522
OCT	8265	6095	3645	2684	2356	1628
NOV	9222	6756	3935	2894	2752	1898
DEC	9861	7099	4093	2970	3136	2134
1988						
JAN	10127	7569	4195	3149	3230	2307
FEB	9741	7415	4017	3075	3083	2205
MAR	9596	7180	4008	2997	3032	2103
APR	8718	6421	3729	2730	2556	1762
MAY	8417	6144	3608	2637	2345	1598
JUNE	8846	6182	3800	2690	2273	1564
JULY	9099	6268	3863	2733	2290	1559
AUG	9037	6367	3929	2807	2302	1580
SEPT	8891	6206	3826	2675	2299	1584
OCT	8606	6337	3725	2740	2460	1697
NOV	9620	7038	4036	2967	2877	1982
DEC	10280	7391	4188	3038	3277	2228
DECEMBER						
1989	10597	7618	4287	3124	3370	2294
1990	10924	7854	4366	3196	3476	2369
1991	11243	8083	4443	3267	3582	2445
1992	11495	8320	4510	3336	3673	2520

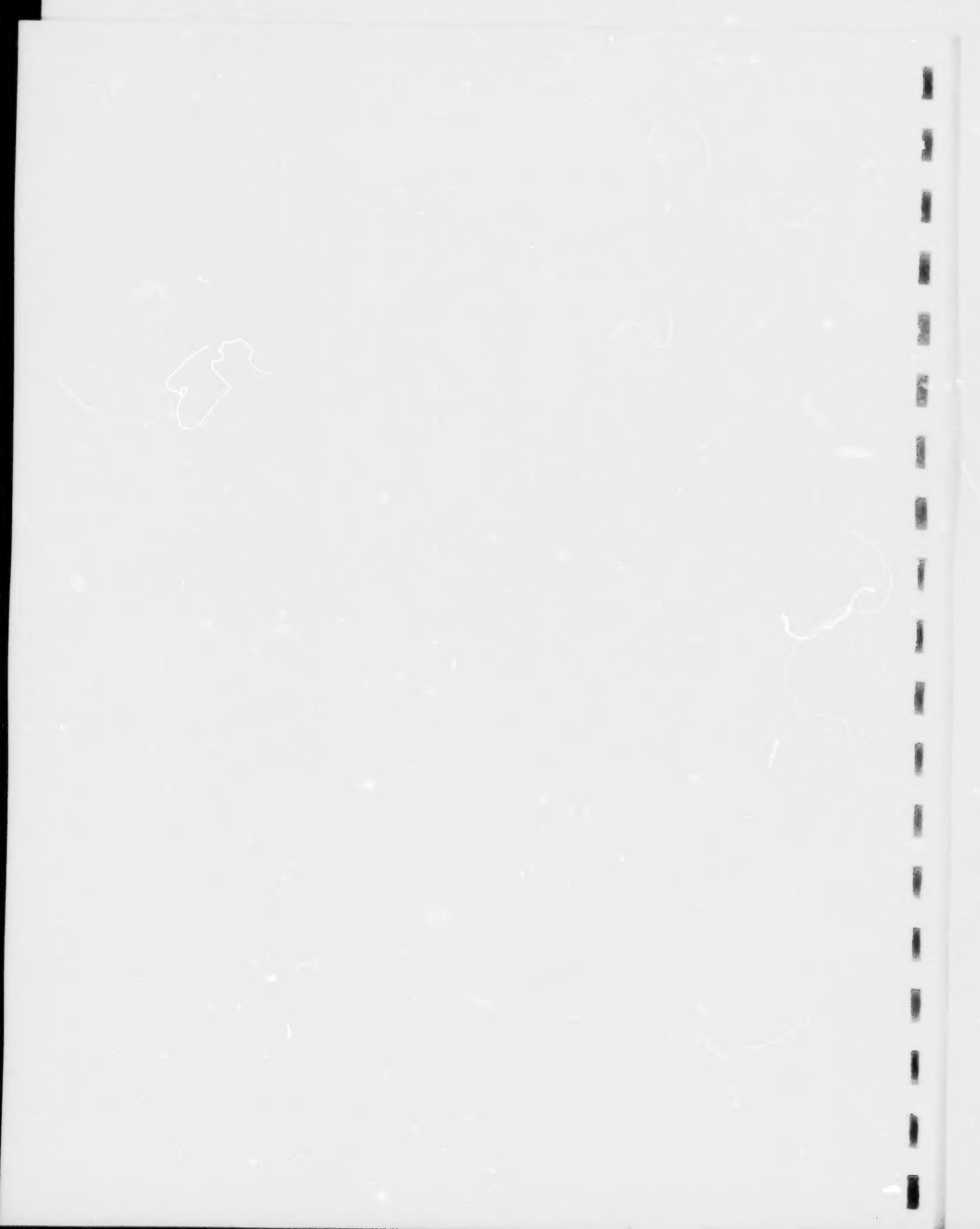
1-HR PEAK

REPORT NO. 871214

TABLE 6 - ES

EAST SYSTEM
SUM OF CUSTOMERS LOADS BY REGION

	GEORGIAN BAY		NORTHEASTERN		TOTAL	
	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW
1987						
JAN	1392	978	1828	1427	20061	14907
FEB	1330	930	1768	1388	19333	14561
MAR	1286	869	1766	1352	19053	14040
APR	1077	707	1570	1190	17095	12418
MAY	990	599	1455	1068	16262	11652
JUNE	894	583	1440	1082	16774	11774
JULY	896	588	1304	882	16923	11672
AUG	902	604	1365	1030	17048	12056
SEPT	946	609	1484	1116	17018	11909
OCT	1075	672	1561	1183	16902	12263
NOV	1198	811	1726	1305	18832	13663
DEC	1391	934	1839	1371	20320	14508
1988						
JAN	1463	1028	1874	1464	20889	15516
FEB	1395	974	1799	1411	20036	15079
MAR	1344	908	1804	1381	19785	14568
APR	1132	734	1608	1219	17743	12867
MAY	1038	628	1524	1122	16932	12130
JUNE	899	580	1400	1041	17218	12057
JULY	895	577	1338	890	17484	12027
AUG	908	598	1388	1036	17565	12388
SEPT	976	613	1433	1065	17425	12143
OCT	1130	709	1536	1159	17456	12642
NOV	1261	854	1706	1284	19501	14125
DEC	1461	981	1847	1375	21053	15012
DECEMBER						
1989	1501	1009	1889	1427	21644	15472
1990	1546	1039	1919	1466	22231	15924
1991	1591	1070	1924	1486	22782	16352
1992	1627	1099	1935	1498	23240	16773



1-HR PEAK

REPORT NO. 871214

TABLE 1 - WS

WEST SYSTEM
CUSTOMERS LOADS AND PRIMARY DEMANDS

	MUNICIPAL		RETAIL		DIRECT	
	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW
1987						
JAN	307	219	201	143	518	440
FEB	288	197	194	135	522	457
MAR	275	186	176	119	528	440
APR	232	160	142	93	529	456
MAY	221	153	139	87	531	450
JUNE	198	141	125	80	532	465
JULY	196	137	113	75	523	444
AUG	198	135	117	77	533	463
SEPT	209	138	130	82	523	448
OCT	231	165	148	92	533	465
NOV	283	199	175	118	531	467
DEC	319	226	191	133	532	439
1988						
JAN	313	223	212	151	536	456
FEB	293	201	202	141	537	477
MAR	280	190	184	124	538	464
APR	235	163	148	97	541	467
MAY	224	156	144	91	544	462
JUNE	202	144	130	83	543	474
JULY	199	139	118	78	543	460
AUG	201	138	121	81	540	467
SEPT	212	140	136	85	536	459
OCT	235	168	154	96	533	464
NOV	288	202	182	123	532	468
DEC	324	230	199	139	532	439
1989						
JAN						
DEC	330	234	203	141	558	472
DECEMBER						
1990	336	238	208	145	547	475
1991	342	242	215	149	543	484
1992	345	246	219	153	554	495

1-HR PEAK

REPORT NO. 871214

TABLE 1 - WS

WEST SYSTEM

CUSTOMERS LOADS AND PRIMARY DEMANDS

	SUM CUSTOMERS LOADS		DIVERSITY AND/OR LOSSES		PRIMARY DEMAND IN TERMS OF GENERATION		LOAD FACTOR %
	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	
1987							
JAN	1027	802	-23	40	1004	842	83.9
FEB	1004	789	-12	32	992	821	82.8
MAR	979	745	-18	30	961	775	80.6
APR	902	709	-27	36	875	745	85.1
MAY	891	690	-39	35	852	725	85.1
JUNE	855	686	-37	34	818	720	88.0
JULY	831	656	-2	32	829	688	83.0
AUG	848	676	-15	40	833	716	86.0
SEPT	862	668	1	43	863	711	82.4
OCT	912	722	-18	39	894	761	85.1
NOV	990	784	-18	31	972	815	83.8
DEC	1042	798	-12	42	1030	840	81.6
1988							
JAN	1061	830	-23	42	1038	872	84.0
FEB	1032	818	-12	33	1020	851	83.4
MAR	1002	778	-18	31	984	809	82.2
APR	924	726	-29	36	895	762	85.1
MAY	913	708	-39	36	874	744	85.1
JUNE	875	701	-38	35	837	736	87.9
JULY	860	677	-3	34	857	711	83.0
AUG	862	685	-14	41	848	726	85.6
SEPT	884	684	1	45	885	729	82.4
OCT	922	728	-18	39	904	767	84.8
NOV	1002	794	-17	32	985	826	83.9
DEC	1056	808	-13	42	1043	850	81.5
1989							
JAN					1040	874	84.0
DEC	1091	847	-13	44	1078	891	82.7
DECEMBER							
1990	1092	859	-13	45	1079	904	83.8
1991	1099	876	-13	46	1086	922	84.9
1992	1117	894	-14	46	1103	940	85.2
1993					1130	967	85.6
1994					1157	992	85.7
1995					1181	1015	85.9
1996					1198	1032	86.1

20-MIN

REPORT NO. 871214

TABLE 1 - WS

WEST SYSTEM

CUSTOMERS LOADS AND PRIMARY DEMANDS

	SUM CUSTOMERS LOADS		DIVERSITY AND/OR LOSSES		PRIMARY DEMAND IN TERMS OF GENERATION		LOAD FACTOR %
	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	PEAK MW	ENERGY AV MW	
1987							
JAN	1033	802	-22	40	1011	842	83.3
FEB	1008	789	-12	32	996	821	82.4
MAR	983	745	-18	30	965	775	80.3
APR	907	709	-28	36	879	745	84.8
MAY	896	690	-39	35	857	725	84.6
JUNE	859	686	-38	34	821	720	87.7
JULY	835	656	-3	32	832	688	82.7
AUG	852	676	-14	40	838	716	85.4
SEPT	867	668	1	43	868	711	81.9
OCT	916	722	-17	39	899	761	84.6
NOV	994	784	-17	31	977	815	83.4
DEC	1048	798	-12	42	1036	840	81.1
1988							
JAN	1068	830	-24	42	1044	872	83.5
FEB	1037	818	-13	33	1024	851	83.1
MAR	1006	778	-18	31	988	809	81.9
APR	929	726	-29	36	900	762	84.7
MAY	918	708	-39	36	879	744	84.6
JUNE	878	701	-38	35	840	736	87.6
JULY	864	677	-3	34	861	711	82.6
AUG	867	685	-15	41	852	726	85.2
SEPT	889	684	1	45	890	729	81.9
OCT	926	728	-17	39	909	767	84.4
NOV	1007	794	-17	32	990	826	83.4
DEC	1061	808	-12	42	1049	850	81.0
1989							
JAN					1047	874	83.5
DEC	1097	847	-13	44	1084	891	82.2
DECEMBER							
1990	1098	859	-13	45	1085	904	83.3
1991	1105	876	-13	46	1092	922	84.4
1992	1123	894	-14	46	1109	940	84.8
1993					1136	967	85.1
1994					1163	992	85.3
1995					1187	1015	85.5
1996					1205	1032	85.6

TOTAL SYSTEM ONTARIO PRIMARY DEMANDS
BASED ON LOAD FORECAST REPORT NO. 871214

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVERAGE OR TOTAL
1987													
20 MIN PEAK MW	21156	20274	20025	17749	16745	17178	17331	17523	17290	17560	19925	21492	18688.8
1 HOUR PEAK MW	20941	20111	19876	17607	16822	17042	17215	17399	17150	17389	19741	21314	18533.0
ENERGY GWH	12215	10788	11490	9866	9616	9348	9638	9928	9490	10882	10855	11903	125249.0
ENERGY AV MW	16418	16054	15443	13707	12925	13011	12954	13344	13180	13351	15076	15999	14299.8
*L.F. %	78.4	79.8	77.7	77.8	77.8	76.3	75.2	76.7	76.9	77.9	76.4	75.1	77.1
1988													
20 MIN PEAK MW	22018	21005	20780	18411	17442	17631	17907	18044	17705	18118	20611	22245	19326.5
1 HOUR PEAK MW	21798	20835	20626	18264	17295	17490	17787	17916	17561	17940	20421	22060	19166.1
ENERGY GWH	12710	11572	11926	10219	10003	9592	9932	10194	9678	10380	11209	12303	129718.6
ENERGY AV MW	17084	16626	16029	14193	13445	13322	13350	13702	13442	13952	15568	16536	14767.6
*L.F. %	78.4	79.8	77.7	77.7	77.7	76.2	75.1	76.5	76.5	77.8	76.2	75.0	77.1
1989													
20 MIN PEAK MW	22676	21603	21340	18914	17969	18149	18446	18582	18225	18594	21167	22874	19880.8
1 HOUR PEAK MW	22449	21429	21183	18764	17818	18005	18323	18451	18107	18412	20972	22685	19716.5
ENERGY GWH	13083	11487	12250	10500	10319	9892	10250	10522	10007	10689	11546	12691	133237.0
ENERGY AV MW	17585	17094	16465	14584	13869	13739	13777	14143	13899	14367	16036	17058	15209.7
*L.F. %	78.3	79.8	77.7	77.7	77.8	76.3	75.2	76.7	76.8	78.0	76.5	75.2	77.1
1990													
20 MIN PEAK MW	23245	22140	21857	19365	18394	18600	18915	19064	18728	19052	21708	23466	20377.9
1 HOUR PEAK MW	23011	21961	21696	19211	18240	18453	18790	18931	18576	18865	21508	23271	20209.3
ENERGY GWH	13447	11810	12583	10790	10601	10164	10545	10837	10300	10987	11874	13053	136988.9
ENERGY AV MW	18074	17575	16912	14986	14248	14116	14173	14566	14306	14767	16491	17544	15638.0
*L.F. %	78.5	80.0	77.9	78.0	78.1	76.5	75.4	76.9	77.0	78.3	76.7	75.4	77.4
1991													
20 MIN PEAK MW	23898	22746	22364	19796	18793	19018	19318	19470	19122	19434	22164	23952	20839.6
1 HOUR PEAK MW	23657	22563	22199	19639	18635	18868	19190	19334	18967	19242	21959	23752	20667.1
ENERGY GWH	13870	12169	12910	11067	10866	10414	10801	11103	10547	11238	12150	13350	140485.9
ENERGY AV MW	18643	18109	17352	15371	14605	14464	14518	14923	14649	15105	16875	17943	16037.2
*L.F. %	78.8	80.3	78.2	78.3	78.4	76.7	75.7	77.2	77.2	78.5	76.8	75.5	77.6
1992													
20 MIN PEAK MW	24359	23168	22834	20186	19151	19405	19695	19848	19486	19782	22591	24430	21244.5
1 HOUR PEAK MW	24112	22980	22664	20025	18990	19251	19564	19709	19327	19585	22382	24225	21067.9
ENERGY GWH	14162	12866	13219	11328	11119	10670	11063	11376	10809	11505	12449	13691	144257.0
ENERGY AV MW	19035	18485	17767	15734	14945	14820	14870	15290	15012	15464	17290	18402	16422.7
*L.F. %	78.9	80.4	78.4	78.6	78.7	77.0	76.0	77.6	77.7	79.0	77.2	76.0	78.0
1993													
20 MIN PEAK MW	24892	23666	23320	20592	19537	19798	20097	20256	19882	20174	23065	24961	21686.6
1 HOUR PEAK MW	24636	23471	23145	20426	19370	19638	19960	20111	19716	19971	22848	24750	21503.6
ENERGY GWH	14571	12781	13600	11643	11438	10974	11381	11700	11115	11823	12800	14083	147911.7
ENERGY AV MW	19585	19019	18279	16171	15374	15241	15297	15726	15438	15891	17777	18929	16884.9
*L.F. %	79.5	81.0	79.0	79.2	79.4	77.6	76.6	78.2	78.3	79.6	77.8	76.5	78.5

*LOAD FACTOR BASED ON 1 HOUR PEAK

TOTAL SYSTEM ONTARIO PRIMARY DEMANDS
BASED ON LOAD FORECAST REPORT NO. 871214

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVERAGE OR TOTAL
1994													
20 MIN PEAK MW	25441.	24177.	23818.	21007.	19944.	20211.	20519.	20683.	20298.	20578.	23554.	25504.	22144.5
1 HOUR PEAK MW	25179.	23976.	23640.	20837.	19771.	20048.	20379.	20536.	20128.	20370.	23330.	25287.	221956.8
ENERGY GWH	14977.	13134.	13971.	11955.	11753.	11274.	11690.	12018.	11415.	12128.	13134.	14451.	151899.5
ENERGY AV MW	20131.	19545.	18779.	16605.	15797.	15658.	15713.	16153.	15854.	16301.	18241.	19423.	17340.1
*L.F. %	80.0	81.5	79.4	79.7	79.9	78.1	77.1	78.7	78.8	80.0	78.2	76.8	79.0
1995													
20 MIN PEAK MW	25936.	24636.	24265.	21375.	20315.	20591.	20908.	21077.	20682.	20934.	23991.	25996.	22559.0
1 HOUR PEAK MW	25667.	24431.	24083.	21203.	20140.	20424.	20766.	20927.	20509.	20722.	23763.	25773.	22367.3
ENERGY GWH	15340.	13449.	14303.	12230.	12036.	11544.	11969.	12304.	11685.	12398.	13431.	14779.	155467.5
ENERGY AV MW	20619.	20014.	19224.	16986.	16177.	16033.	16088.	16537.	16230.	16664.	18654.	19865.	17747.4
*L.F. %	80.3	81.9	79.8	80.1	80.3	78.5	77.5	79.0	79.1	80.4	78.5	77.1	79.3
1996													
20 MIN PEAK MW	26291.	24962.	24586.	21633.	20598.	20883.	21210.	21384.	20983.	21197.	24321.	26370.	22868.2
1 HOUR PEAK MW	26016.	24753.	24399.	21457.	20419.	20712.	21064.	21231.	20806.	20979.	24087.	26142.	22672.1
ENERGY GWH	15607.	13673.	14542.	12425.	12244.	11742.	12173.	12514.	11883.	12585.	13641.	15015.	158043.9
ENERGY AV MW	20977.	20346.	19546.	17256.	16457.	16308.	16362.	16820.	16504.	16915.	18945.	20181.	18041.5
*L.F. %	80.6	82.2	80.1	80.4	80.6	78.7	77.7	79.2	79.3	80.6	78.7	77.2	79.6
1997													
20 MIN PEAK MW	26785.	25424.	25040.	22013.	21006.	21301.	21638.	21821.	21412.	21581.	24790.	26894.	23308.8
1 HOUR PEAK MW	26502.	25210.	24849.	21831.	20832.	21126.	21488.	21663.	21230.	21359.	24550.	26660.	23107.6
ENERGY GWH	15930.	13959.	14837.	12667.	12502.	11990.	12431.	12780.	12135.	12830.	13916.	15323.	161298.2
ENERGY AV MW	21411.	20773.	19942.	17594.	16804.	16652.	16708.	17177.	16854.	17245.	19327.	20596.	18413.0
*L.F. %	80.8	82.4	80.3	80.6	80.7	78.8	77.8	79.3	79.4	80.7	78.7	77.3	79.7
1998													
20 MIN PEAK MW	27288.	25895.	25503.	22403.	21422.	21725.	22071.	22259.	21841.	21967.	25256.	27413.	23753.7
1 HOUR PEAK MW	26998.	25676.	25307.	22217.	21234.	21546.	21919.	22097.	21654.	21738.	25010.	27173.	23547.4
ENERGY GWH	16244.	14234.	15127.	12906.	12758.	12234.	12686.	13044.	12385.	13076.	14192.	15632.	164518.0
ENERGY AV MW	21833.	21182.	20332.	17926.	17147.	16992.	17050.	17532.	17201.	17575.	19711.	21011.	18780.6
*L.F. %	80.9	82.5	80.3	80.7	80.8	78.9	77.8	79.3	79.4	80.9	78.8	77.3	79.8
1999													
20 MIN PEAK MW	27829.	26406.	26008.	22834.	21870.	22183.	22541.	22736.	22308.	22401.	25777.	27994.	24240.6
1 HOUR PEAK MW	27534.	26182.	25808.	22644.	21678.	22000.	22385.	22571.	22118.	22168.	25527.	27748.	24030.3
ENERGY GWH	16587.	14536.	15447.	13177.	13037.	12504.	12967.	13337.	12663.	13359.	14507.	15985.	168106.2
ENERGY AV MW	22295.	21631.	20762.	18301.	17523.	17367.	17428.	17926.	17588.	17955.	20149.	21486.	19190.2
*L.F. %	81.0	82.6	80.4	80.8	80.8	78.9	77.9	79.4	79.5	81.0	78.9	77.4	79.9
2000													
20 MIN PEAK MW	28437.	26979.	26574.	23321.	22362.	22684.	23051.	23252.	22815.	22883.	26348.	28622.	24777.2
1 HOUR PEAK MW	28134.	26749.	26367.	23125.	22164.	22495.	22890.	23082.	22619.	22642.	26090.	28370.	24560.6
ENERGY GWH	16965.	14850.	15799.	13473.	13341.	12796.	13270.	13650.	12961.	13664.	14843.	16360.	171974.5
ENERGY AV MW	22803.	22099.	21236.	18712.	17932.	17772.	17836.	18347.	18001.	18366.	20616.	21990.	19631.8
*L.F. %	81.1	82.6	80.5	80.9	80.9	79.0	77.9	79.5	79.6	81.1	79.0	77.5	79.9

*LOAD FACTOR BASED ON 1 HOUR PEAK

TOTAL SYSTEM ONTARIO PRIMARY DEMANDS
BASED ON LOAD FORECAST REPORT NO. 871214

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVERAGE OR TOTAL
2001													
20 MIN PEAK MW	29141.	27649.	27237.	23901.	22933.	23268.	23648.	23857.	23411.	23472.	27037.	29380.	25411.1
1 HOUR PEAK MW	28829.	27412.	27026.	23700.	22730.	23073.	23482.	23683.	23210.	23225.	26771.	29121.	25188.5
ENERGY GWH	17407.	15255.	16215.	13827.	13697.	13139.	13628.	14020.	13314.	14035.	15251.	16812.	176692.5
ENERGY AV MW	23397.	22702.	21794.	19205.	18410.	18248.	18317.	18844.	18492.	18864.	21182.	22597.	20160.1
*L.F. %	81.2	82.8	80.6	81.0	81.0	79.1	78.0	79.6	79.7	81.2	79.1	77.6	80.0
2002													
20 MIN PEAK MW	29535.	28021.	27603.	24217.	23246.	23586.	23973.	24186.	23734.	23784.	27404.	29784.	25756.2
1 HOUR PEAK MW	29219.	27780.	27389.	24012.	23039.	23389.	23804.	24008.	23529.	23533.	27135.	29521.	25529.9
ENERGY GWH	17657.	15475.	16446.	14024.	13895.	13329.	13825.	14224.	13506.	14234.	15469.	17053.	179137.9
ENERGY AV MW	23732.	23029.	22105.	19478.	18676.	18513.	18582.	19118.	18759.	19132.	21484.	22920.	20449.5
*L.F. %	81.2	82.9	80.7	81.1	81.1	79.2	78.1	79.6	79.7	81.3	79.2	77.6	80.1
2003													
20 MIN PEAK MW	30053.	28510.	28085.	24634.	23657.	24003.	24397.	24614.	24155.	24197.	27886.	30310.	26208.2
1 HOUR PEAK MW	29730.	28264.	27866.	24427.	23447.	23803.	24226.	24434.	23946.	23941.	27611.	30042.	25378.0
ENERGY GWH	17974.	15752.	16740.	14273.	14146.	13569.	14074.	14480.	13750.	14486.	15745.	17360.	182350.5
ENERGY AV MW	24159.	23441.	22501.	19823.	19013.	18846.	18917.	19462.	19098.	19471.	21868.	23333.	20816.3
*L.F. %	81.3	82.9	80.7	81.2	81.1	79.2	78.1	79.7	79.8	81.3	79.2	77.7	80.1
2004													
20 MIN PEAK MW	30536.	28966.	28534.	25024.	24039.	24391.	24793.	25014.	24545.	24579.	28332.	30800.	26629.4
1 HOUR PEAK MW	30207.	28716.	28311.	24812.	23825.	24187.	24619.	24830.	24335.	24320.	28053.	30527.	26395.2
ENERGY GWH	18270.	15992.	17015.	14505.	14379.	13793.	14307.	14720.	13978.	14723.	16004.	17645.	185332.6
ENERGY AV MW	24556.	23797.	22870.	20146.	19327.	19157.	19230.	19785.	19414.	19790.	22228.	23716.	21156.7
*L.F. %	81.3	82.9	80.8	81.2	81.1	79.2	78.1	79.7	79.8	81.4	79.2	77.7	80.2
2005													
20 MIN PEAK MW	30915.	29324.	28886.	25327.	24340.	24697.	25106.	25328.	24854.	24877.	28682.	31216.	26962.5
1 HOUR PEAK MW	30583.	29070.	28660.	25113.	24122.	24491.	24928.	25143.	24640.	24613.	28400.	30907.	26722.5
ENERGY GWH	18506.	16217.	17234.	14689.	14566.	13972.	14492.	14911.	14159.	14909.	16208.	17873.	187739.4
ENERGY AV MW	24874.	24132.	23164.	20402.	19578.	19406.	19479.	20042.	19666.	20039.	22512.	24022.	21431.4
*L.F. %	81.3	83.0	80.8	81.2	81.2	79.2	78.1	79.7	79.8	81.4	79.3	77.7	80.2
2006													
20 MIN PEAK MW	31406.	29787.	29341.	25722.	24729.	25091.	25507.	25734.	25252.	25264.	29135.	31679.	27387.3
1 HOUR PEAK MW	31066.	29530.	29112.	25504.	24508.	24881.	25327.	25546.	25033.	24997.	28847.	31398.	27145.9
ENERGY GWH	18805.	16479.	17512.	14925.	14804.	14199.	14728.	15154.	14390.	15148.	16470.	18161.	190776.8
ENERGY AV MW	25275.	24523.	23537.	20729.	19897.	19721.	19796.	20368.	19987.	20361.	22875.	24411.	21778.2
*L.F. %	81.4	83.0	80.8	81.3	81.2	79.3	78.2	79.7	79.8	81.5	79.3	77.7	80.2
2007													
20 MIN PEAK MW	31817.	30175.	29724.	26053.	25055.	25424.	25844.	26075.	25586.	25589.	29515.	32075.	27745.9
1 HOUR PEAK MW	31472.	29914.	29491.	25831.	24831.	25210.	25662.	25882.	25364.	25317.	29223.	31810.	27500.7
ENERGY GWH	19059.	16701.	17747.	15124.	15004.	14392.	14929.	15361.	14586.	15349.	16691.	18406.	193352.5
ENERGY AV MW	25618.	24853.	23854.	21085.	20167.	19989.	20066.	20846.	20259.	20631.	23182.	24740.	22072.2
*L.F. %	81.4	83.1	80.9	81.3	81.2	79.3	78.2	79.8	79.9	81.5	79.3	77.8	80.3

*LOAD FACTOR BASED ON 1 HOUR PEAK

TOTAL SYSTEM ONTARIO PRIMARY DEMANDS
BASED ON LOAD FORECAST REPORT NO. 871214

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVERAGE OR TOTAL
2008													
20 MIN PEAK MW	32251.	30586.	30128.	26402.	25400.	25774.	26201.	26435.	25939.	25933.	29916.	32536.	28125.0
1 HOUR PEAK MW	31903.	30321.	29891.	26178.	25173.	25557.	26016.	26241.	25714.	25657.	29621.	32246.	27876.5
ENERGY GWH	19328.	16912.	17996.	15334.	15216.	14596.	15140.	15579.	14782.	15563.	16925.	18666.	196046.9
ENERGY AV MW	25978.	25167.	24188.	21297.	20452.	20272.	20349.	20939.	20585.	20918.	23507.	25089.	22379.8
*L.F. %	81.4	83.0	80.9	81.4	81.2	79.3	78.2	79.8	79.9	81.5	79.4	77.8	80.3
2009													
20 MIN PEAK MW	32662.	30973.	30508.	26730.	25726.	26105.	26537.	26776.	26273.	26255.	30294.	32952.	28482.5
1 HOUR PEAK MW	32308.	30705.	30269.	26504.	25495.	25886.	26350.	26578.	26044.	25976.	29994.	32658.	28230.5
ENERGY GWH	19581.	17158.	18232.	15532.	15418.	14789.	15340.	15784.	14988.	15765.	17146.	18910.	198642.3
ENERGY AV MW	26319.	25533.	24505.	21572.	20723.	20340.	20618.	21215.	20817.	21189.	23814.	25416.	22676.1
*L.F. %	81.5	83.2	81.0	81.4	81.3	79.3	78.2	79.8	79.9	81.6	79.4	77.8	80.3
2010													
20 MIN PEAK MW	33110.	31396.	30924.	27092.	26080.	26465.	26905.	27147.	26636.	26688.	30709.	33404.	28872.8
1 HOUR PEAK MW	32749.	31123.	30681.	26860.	25846.	26242.	26714.	26945.	26404.	26325.	30404.	33106.	28616.8
ENERGY GWH	19856.	17398.	18486.	15748.	15635.	14998.	15556.	16007.	15200.	15983.	17385.	19176.	201428.3
ENERGY AV MW	26688.	25890.	24846.	21872.	21015.	20830.	20909.	21515.	21111.	21483.	24146.	25774.	22994.1
*L.F. %	81.5	83.2	81.0	81.4	81.3	79.4	78.3	79.8	80.0	81.6	79.4	77.9	80.4

*LOAD FACTOR BASED ON 1 HOUR PEAK

EAST SYSTEM ONTARIO PRIMARY DEMANDS
BASED ON THE LOAD FORECAST REPORT NO. 871214

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVERAGE OR TOTAL
1987													
20 MIN PEAK MW	20188.	19364.	19095.	16942.	15944.	16363.	16558.	16727.	16495.	16678.	18964.	20498.	17818.0
1 HOUR PEAK MW	19981.	19205.	18950.	16805.	15807.	16231.	16445.	16607.	16360.	16511.	18785.	20325.	17667.5
ENERGY GWH	11589.	10237.	10913.	9333.	9078.	8850.	9125.	9395.	8978.	9516.	10268.	11278.	118557.0
ENERGY AV MW	15576.	15233.	14668.	12962.	12201.	12291.	12265.	12628.	12469.	12790.	14261.	15159.	13533.9
*L.F. %	78.0	79.3	77.4	77.1	77.2	75.7	74.6	76.0	76.2	77.5	75.9	74.6	76.6
1988													
20 MIN PEAK MW	21020.	20069.	19828.	17585.	16601.	16797.	17108.	17234.	16891.	17226.	19638.	21238.	18436.2
1 HOUR PEAK MW	20806.	19903.	19679.	17442.	16458.	16660.	16990.	17110.	16751.	17052.	19452.	21058.	18280.2
ENERGY GWH	12062.	10979.	11323.	9670.	9450.	9062.	9403.	9654.	9154.	9810.	10614.	11670.	122852.1
ENERGY AV MW	16213.	15775.	15219.	13431.	12702.	12586.	12639.	12976.	12714.	13186.	14742.	15686.	13985.9
*L.F. %	77.9	79.3	77.3	77.0	77.2	75.5	74.4	75.8	75.9	77.3	75.8	74.5	76.5
1989													
20 MIN PEAK MW	21675.	20663.	20382.	18082.	17119.	17306.	17635.	17755.	17418.	17677.	20165.	21834.	18976.0
1 HOUR PEAK MW	21454.	20493.	20229.	17936.	16972.	17166.	17515.	17629.	17275.	17499.	19974.	21650.	18816.1
ENERGY GWH	12433.	10912.	11642.	9945.	9756.	9352.	9708.	9965.	9461.	10095.	10925.	12028.	126221.1
ENERGY AV MW	16711.	16238.	15648.	13812.	13113.	12989.	13048.	13394.	13140.	13568.	15174.	16167.	14408.8
*L.F. %	77.9	79.2	77.4	77.0	77.3	75.7	74.5	76.0	76.1	77.5	76.0	74.7	76.6
1990													
20 MIN PEAK MW	22215.	21176.	20876.	18514.	17528.	17744.	18093.	18230.	17885.	18131.	20703.	22426.	19460.1
1 HOUR PEAK MW	21988.	21002.	20719.	18365.	17378.	17600.	17971.	18101.	17738.	17948.	20507.	22237.	19296.1
ENERGY GWH	12768.	11209.	11951.	10212.	10018.	9606.	9987.	10265.	9741.	10380.	11241.	12380.	129757.5
ENERGY AV MW	17161.	16680.	16063.	14184.	13465.	13341.	13423.	13797.	13529.	13952.	15613.	16640.	14812.5
*L.F. %	78.0	79.4	77.5	77.2	77.5	75.8	74.7	76.2	76.3	77.7	76.1	74.8	76.8
1991													
20 MIN PEAK MW	22867.	21783.	21382.	18947.	17926.	18163.	18497.	18636.	18278.	18510.	21153.	22906.	19920.6
1 HOUR PEAK MW	22633.	21604.	21221.	18795.	17773.	18016.	18372.	18504.	18128.	18322.	20954.	22712.	19752.8
ENERGY GWH	13181.	11560.	12269.	10480.	10274.	9847.	10234.	10521.	9977.	10621.	11506.	12664.	133134.5
ENERGY AV MW	17717.	17202.	16490.	14556.	13809.	13677.	13755.	14141.	13857.	14276.	15881.	17022.	15198.0
*L.F. %	78.3	79.6	77.7	77.4	77.7	75.9	74.9	76.4	76.4	77.9	76.3	74.9	76.9
1992													
20 MIN PEAK MW	23324.	22201.	21847.	19333.	18279.	18543.	18866.	19005.	18632.	18846.	21566.	23367.	20317.3
1 HOUR PEAK MW	23084.	22017.	21682.	19177.	18122.	18393.	18739.	18871.	18478.	18654.	21362.	23168.	20145.5
ENERGY GWH	13461.	12223.	12566.	10732.	10516.	10093.	10484.	10782.	10228.	10876.	11791.	12991.	136744.0
ENERGY AV MW	18093.	17562.	16890.	14905.	14134.	14018.	14092.	14492.	14205.	14618.	16377.	17461.	15567.4
*L.F. %	78.4	79.8	77.9	77.7	78.0	76.2	75.2	76.8	76.9	78.4	76.7	75.4	77.3
1993													
20 MIN PEAK MW	23833.	22676.	22308.	19720.	18646.	18917.	19249.	19392.	19007.	19217.	22016.	23867.	20737.2
1 HOUR PEAK MW	23585.	22486.	22138.	19559.	18482.	18760.	19116.	19254.	18848.	19018.	21803.	23662.	20559.3
ENERGY GWH	13851.	12143.	12929.	11029.	10817.	10380.	10786.	11089.	10518.	11176.	12125.	13364.	140206.8
ENERGY AV MW	18617.	18071.	17377.	15318.	14539.	14417.	14497.	14905.	14608.	15022.	16840.	17962.	16005.3
*L.F. %	78.9	80.4	78.5	78.3	78.7	76.8	75.8	77.4	77.5	79.0	77.2	75.9	77.8

* LOAD FACTOR BASED ON 1 HOUR PEAK

EAST SYSTEM ONTARIO PRIMARY DEMANDS
BASED ON THE LOAD FORECAST REPORT NO. 871214

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVERAGE OR TOTAL
1994													
20 MIN PEAK MW	24356.	23163.	22783.	20116.	19030.	19309.	19651.	19800.	19404.	19598.	22479.	24385.	21172.7
1 HOUR PEAK MW	24201.	22967.	22608.	19951.	18861.	19148.	19515.	19657.	19239.	19394.	22261.	24174.	20989.6
ENERGY GWH	14236.	12478.	13282.	11324.	11114.	10663.	11079.	11390.	10801.	11464.	12441.	13713.	143984.8
ENERGY AV MW	19135.	18569.	17852.	15728.	14938.	14810.	14891.	15309.	15001.	15409.	17279.	18431.	16436.6
*L.F. %	79.4	80.9	79.0	78.8	79.2	77.3	76.3	77.9	78.0	79.5	77.6	76.2	78.3
1995													
20 MIN PEAK MW	24829.	23601.	23210.	20468.	19383.	19671.	20023.	20175.	19769.	19936.	22895.	24852.	21567.5
1 HOUR PEAK MW	24568.	23402.	23032.	20299.	19212.	19507.	19884.	20030.	19601.	19728.	22672.	24636.	21380.9
ENERGY GWH	14581.	12778.	13596.	11585.	11381.	10918.	11343.	11661.	11056.	11718.	12722.	14024.	147363.6
ENERGY AV MW	19599.	19014.	18275.	16090.	15298.	15164.	15246.	15673.	15355.	15751.	17669.	18850.	16822.3
*L.F. %	79.8	81.3	79.3	79.3	79.6	77.7	76.7	78.2	78.3	79.8	77.9	76.5	78.7
1996													
20 MIN PEAK MW	25166.	23913.	23514.	20713.	19651.	19947.	20310.	20468.	20056.	20184.	23209.	25210.	21861.7
1 HOUR PEAK MW	24901.	23710.	23333.	20542.	19476.	19781.	20169.	20321.	19885.	19972.	22982.	24990.	21671.7
ENERGY GWH	14835.	12990.	13824.	11769.	11578.	11106.	11537.	11861.	11235.	11895.	12921.	14248.	149804.5
ENERGY AV MW	19939.	19330.	18581.	16345.	15562.	15424.	15506.	15942.	15615.	15988.	17946.	19150.	17101.0
*L.F. %	80.1	81.5	79.6	79.6	79.9	78.0	76.9	78.5	78.5	80.1	78.1	76.6	78.9
1997													
20 MIN PEAK MW	25638.	24354.	23947.	21076.	20039.	20345.	20720.	20885.	20464.	20549.	23654.	25709.	22281.7
1 HOUR PEAK MW	25365.	24146.	23761.	20900.	19859.	20174.	20575.	20733.	20289.	20331.	23421.	25483.	22086.5
ENERGY GWH	15141.	13262.	14104.	11998.	11823.	11339.	11780.	12112.	11480.	12126.	13181.	14539.	152884.9
ENERGY AV MW	20351.	19736.	18957.	16664.	15890.	15749.	15833.	16280.	15945.	16288.	18306.	19542.	17452.6
*L.F. %	80.2	81.7	79.8	79.7	80.0	78.1	77.0	78.5	78.6	80.2	78.2	76.7	79.0
1998													
20 MIN PEAK MW	26120.	24806.	24390.	21449.	20435.	20750.	21134.	21304.	20874.	20914.	24098.	26206.	22706.6
1 HOUR PEAK MW	25840.	24592.	24199.	21268.	20251.	20574.	20985.	21149.	20694.	20590.	23859.	25974.	22506.2
ENERGY GWH	15440.	13523.	14380.	12225.	12063.	11570.	12021.	12362.	11717.	12358.	13442.	14833.	155932.9
ENERGY AV MW	20752.	20123.	19328.	16979.	16214.	16070.	16157.	16616.	16273.	16610.	18670.	19937.	17800.6
*L.F. %	80.3	81.8	79.9	79.8	80.1	78.1	77.0	78.6	78.6	80.3	78.3	76.8	79.1
1999													
20 MIN PEAK MW	26637.	25295.	24873.	21862.	20862.	21187.	21583.	21760.	21321.	21328.	24596.	26761.	23172.1
1 HOUR PEAK MW	26351.	25076.	24677.	21677.	20674.	21008.	21432.	21601.	21137.	21100.	24352.	26524.	22967.4
ENERGY GWH	15766.	13809.	14684.	12480.	12328.	11825.	12287.	12639.	11980.	12625.	13740.	15168.	159331.1
ENERGY AV MW	21191.	20549.	19737.	17333.	16570.	16424.	16515.	16988.	16639.	16969.	19084.	20386.	18188.5
*L.F. %	80.4	81.9	80.0	80.0	80.1	78.2	77.1	78.6	78.7	80.4	78.4	76.9	79.2
2000													
20 MIN PEAK MW	27221.	25845.	25414.	22328.	21331.	21665.	22073.	22255.	21805.	21787.	25140.	27362.	23685.6
1 HOUR PEAK MW	26926.	25620.	25213.	22138.	21138.	21480.	21916.	22091.	21616.	21552.	24889.	27118.	23474.8
ENERGY GWH	16125.	14109.	15019.	12760.	12614.	12101.	12575.	12936.	12261.	12913.	14059.	15523.	162995.3
ENERGY AV MW	21674.	20995.	20186.	17723.	16955.	16807.	16901.	17387.	17030.	17356.	19527.	20865.	18606.8
*L.F. %	80.5	81.9	80.1	80.1	80.2	78.2	77.1	78.7	78.8	80.5	78.5	76.9	79.3

* LOAD FACTOR BASED ON 1 HOUR PEAK

JAN 07/88

EAST SYSTEM ONTARIO PRIMARY DEMANDS
BASED ON THE LOAD FORECAST REPORT NO. 871214

PAGE 3

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVERAGE OR TOTAL
2001													
20 MIN PEAK MW	27894.	26486.	26049.	22883.	21876.	22222.	22643.	22833.	22374.	22347.	25798.	28086.	24290.9
1 HOUR PEAK MW	27592.	26256.	25843.	22688.	21678.	22033.	22483.	22666.	22181.	22106.	25540.	27874.	24075.0
ENERGY GWH	16545.	14494.	15414.	13097.	12951.	12425.	12914.	13286.	12595.	13264.	14445.	15952.	167381.5
ENERGY AV MW	22238.	21568.	20718.	18190.	17408.	17257.	17357.	17858.	17494.	17828.	20062.	21440.	19107.5
*L.F. %	80.6	82.1	80.2	80.2	80.3	78.3	77.2	78.8	78.9	80.6	78.6	77.0	79.4
2002													
20 MIN PEAK MW	28272.	26843.	26399.	23185.	22174.	22526.	22954.	23148.	22682.	22643.	26148.	28472.	24620.5
1 HOUR PEAK MW	27965.	26609.	26190.	22988.	21972.	22354.	22791.	22977.	22485.	22398.	25886.	28218.	24401.1
ENERGY GWH	16783.	14702.	15634.	13282.	13139.	12605.	13100.	13479.	12778.	13451.	14651.	16181.	169783.5
ENERGY AV MW	22558.	21877.	21014.	18447.	17659.	17507.	17608.	18117.	17747.	18080.	20348.	21748.	19381.7
*L.F. %	80.7	82.2	80.2	80.2	80.4	78.4	77.3	78.8	78.9	80.7	78.6	77.1	79.4
2003													
20 MIN PEAK MW	28766.	27311.	26859.	23585.	22565.	22924.	23361.	23558.	23084.	23036.	26607.	28975.	25052.7
1 HOUR PEAK MW	28454.	27072.	26646.	23384.	22359.	22728.	23195.	23384.	22883.	22787.	26340.	28716.	24829.0
ENERGY GWH	17084.	14965.	15914.	13518.	13375.	12832.	13336.	13722.	13008.	13690.	14913.	16471.	172828.5
ENERGY AV MW	22962.	22269.	21390.	18775.	17977.	17822.	17925.	18444.	18067.	18401.	20712.	22138.	19729.3
*L.F. %	80.7	82.3	80.3	80.3	80.4	78.4	77.3	78.9	79.0	80.8	78.6	77.1	79.5
2004													
20 MIN PEAK MW	29228.	27748.	27288.	23958.	22930.	23295.	23740.	23941.	23458.	23400.	27033.	29442.	25455.1
1 HOUR PEAK MW	28911.	27505.	27072.	23753.	22721.	23096.	23571.	23764.	23255.	23146.	26762.	29179.	25227.9
ENERGY GWH	17366.	15192.	16175.	13738.	13596.	13044.	13557.	13950.	13223.	13913.	15157.	16742.	175654.2
ENERGY AV MW	23341.	22608.	21741.	19081.	18275.	18117.	18222.	18749.	18366.	18700.	21052.	22503.	20051.8
*L.F. %	80.7	82.2	80.3	80.3	80.4	78.4	77.3	78.9	79.0	80.8	78.7	77.1	79.5
2005													
20 MIN PEAK MW	29592.	28091.	27626.	24249.	23217.	23588.	24038.	24242.	23753.	23684.	27367.	29810.	25771.5
1 HOUR PEAK MW	29270.	27845.	27406.	24041.	23005.	23385.	23867.	24063.	23546.	23426.	27092.	29543.	25540.9
ENERGY GWH	17589.	15407.	16382.	13912.	13773.	13213.	13733.	14131.	13395.	14089.	15351.	16957.	177933.8
ENERGY AV MW	23642.	22927.	22019.	19322.	18512.	18352.	18458.	18993.	18604.	18937.	21321.	22792.	20312.1
*L.F. %	80.8	82.3	80.3	80.4	80.5	78.5	77.3	78.9	79.0	80.8	78.7	77.1	79.5
2006													
20 MIN PEAK MW	30061.	28534.	28061.	24628.	23587.	23964.	24423.	24630.	24133.	24053.	27799.	30284.	26179.8
1 HOUR PEAK MW	29733.	28284.	27837.	24416.	23372.	23758.	24248.	24447.	23922.	23791.	27519.	30012.	25944.9
ENERGY GWH	17874.	15656.	16647.	14135.	13997.	13428.	13956.	14361.	13613.	14315.	15599.	17232.	180812.3
ENERGY AV MW	24024.	23297.	22374.	19632.	18813.	18650.	18759.	19303.	18907.	19240.	21665.	23161.	20640.7
*L.F. %	80.8	82.4	80.4	80.4	80.5	78.5	77.4	79.0	79.0	80.9	78.7	77.2	79.6
2007													
20 MIN PEAK MW	30455.	28906.	28426.	24943.	23898.	24281.	24746.	24956.	24452.	24361.	28161.	30682.	26522.3
1 HOUR PEAK MW	30122.	28652.	28199.	24728.	23679.	24072.	24569.	24771.	24238.	24095.	27876.	30406.	26283.9
ENERGY GWH	18115.	15867.	16870.	14323.	14187.	13611.	14146.	14557.	13798.	14505.	15808.	17464.	183252.0
ENERGY AV MW	24349.	23611.	22675.	19893.	19069.	18904.	19013.	19565.	19164.	19496.	21956.	23474.	20919.2
*L.F. %	80.8	82.4	80.4	80.4	80.5	78.5	77.4	79.0	79.1	80.9	78.8	77.2	79.6

* LOAD FACTOR BASED ON 1 HOUR PEAK

EAST SYSTEM ONTARIO PRIMARY DEMANDS
BASED ON THE LOAD FORECAST REPORT NO. 871214

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVERAGE OR TOTAL
2008													
20 MIN PEAK MW	30871.	29308.	28813.	25278.	24227.	24616.	25088.	25301.	24790.	24688.	28564.	31102.	26884.8
1 HOUR PEAK MW	30533.	29042.	28582.	25060.	24005.	24403.	24908.	25113.	24572.	24418.	28236.	30822.	26642.9
ENERGY GWH	18370.	16048.	17107.	14522.	14387.	13803.	14346.	14762.	13993.	14707.	16030.	17710.	185804.2
ENERGY AV MW	24691.	23910.	22993.	20170.	19338.	19170.	19282.	19842.	19435.	19767.	22263.	23804.	21210.5
*L.F. %	80.9	82.3	80.4	80.5	80.6	78.6	77.4	79.0	79.1	81.0	78.8	77.2	79.6
2009													
20 MIN PEAK MW	31264.	29671.	29177.	25593.	24538.	24931.	25410.	25626.	25108.	24995.	28905.	31499.	27226.4
1 HOUR PEAK MW	30922.	29410.	28944.	25373.	24313.	24717.	25228.	25436.	24888.	24722.	28613.	31216.	26981.9
ENERGY GWH	18611.	16300.	17330.	14710.	14578.	13985.	14535.	14958.	14178.	14897.	16239.	17942.	188263.5
ENERGY AV MW	25015.	24257.	23294.	20430.	19593.	19424.	19537.	20105.	19692.	20023.	22554.	24116.	21491.3
*L.F. %	80.9	82.5	80.5	80.5	80.6	78.6	77.4	79.0	79.1	81.0	78.8	77.3	79.7
2010													
20 MIN PEAK MW	31692.	30076.	29575.	25938.	24876.	25275.	25761.	25981.	25455.	25331.	29300.	31932.	27599.2
1 HOUR PEAK MW	31345.	29810.	29337.	25713.	24647.	25057.	25576.	25788.	25231.	25053.	29002.	31644.	27350.4
ENERGY GWH	18872.	16529.	17573.	14914.	14783.	14182.	14740.	15169.	14378.	15103.	16465.	18194.	190902.8
ENERGY AV MW	25366.	24596.	23619.	20714.	19870.	19698.	19812.	20389.	19970.	20300.	22869.	24454.	21792.6
*L.F. %	80.9	82.5	80.5	80.6	80.6	78.6	77.5	79.1	79.1	81.0	78.9	77.3	79.7

* LOAD FACTOR BASED ON 1 HOUR PEAK

WEST SYSTEM ONTARIO PRIMARY DEMANDS
BASED ON THE LOAD FORECAST REPORT NO. 871214

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVERAGE OR TOTAL
1987													
20 MIN PEAK MW	1011.	996.	965.	879.	857.	821.	832.	838.	868.	899.	977.	1036.	914.9
1 HOUR PEAK MW	1004.	992.	961.	875.	852.	818.	829.	833.	863.	894.	972.	1030.	910.3
ENERGY GWH	626.	552.	577.	536.	539.	518.	512.	533.	512.	566.	587.	625.	6683.0
ENERGY AV MW	842.	821.	775.	745.	725.	720.	688.	716.	711.	761.	815.	840.	762.9
*L.F. %	83.9	82.8	80.6	85.1	85.1	88.0	83.0	86.0	82.4	85.1	83.8	81.6	83.8
1988													
20 MIN PEAK MW	1044.	1024.	988.	900.	879.	840.	861.	852.	890.	909.	998.	1049.	935.5
1 HOUR PEAK MW	1038.	1020.	984.	895.	874.	837.	857.	848.	885.	904.	985.	1043.	930.8
ENERGY GWH	649.	592.	602.	549.	554.	530.	529.	540.	525.	571.	595.	632.	6865.6
ENERGY AV MW	872.	851.	809.	762.	744.	736.	711.	726.	729.	767.	826.	850.	781.6
*L.F. %	84.0	83.4	82.2	85.1	85.1	87.9	83.0	85.6	82.4	84.8	83.9	81.5	84.0
1989													
20 MIN PEAK MW	1047.	1028.	994.	908.	889.	850.	875.	870.	915.	935.	1019.	1084.	951.0
1 HOUR PEAK MW	1040.	1024.	990.	903.	884.	847.	871.	866.	910.	930.	1014.	1078.	946.3
ENERGY GWH	650.	575.	608.	556.	562.	540.	542.	557.	546.	594.	621.	663.	7015.0
ENERGY AV MW	874.	856.	817.	772.	756.	750.	728.	749.	759.	799.	862.	891.	800.8
*L.F. %	84.0	83.6	82.5	85.5	85.5	88.5	83.6	86.5	83.4	85.9	85.0	82.7	84.6
1990													
20 MIN PEAK MW	1078.	1056.	1019.	928.	906.	863.	887.	879.	922.	939.	1023.	1085.	965.5
1 HOUR PEAK MW	1071.	1051.	1015.	923.	901.	860.	883.	875.	917.	934.	1018.	1079.	960.7
ENERGY GWH	679.	601.	632.	578.	583.	558.	559.	572.	631.	606.	673.	7231.4	7231.4
ENERGY AV MW	913.	894.	850.	803.	783.	775.	751.	769.	778.	815.	877.	904.	825.5
*L.F. %	85.2	85.1	83.7	87.0	86.9	90.1	85.1	87.9	84.8	87.3	86.1	83.8	85.9
1991													
20 MIN PEAK MW	1079.	1057.	1020.	928.	907.	863.	888.	880.	925.	942.	1028.	1092.	967.4
1 HOUR PEAK MW	1072.	1052.	1016.	923.	902.	859.	884.	875.	920.	937.	1023.	1086.	962.5
ENERGY GWH	689.	610.	641.	587.	592.	567.	568.	582.	570.	618.	644.	686.	7351.4
ENERGY AV MW	926.	907.	862.	815.	796.	787.	763.	782.	791.	830.	894.	922.	839.2
*L.F. %	86.4	86.2	84.8	88.3	88.2	91.6	86.3	89.4	86.0	88.6	87.4	84.9	87.2
1992													
20 MIN PEAK MW	1084.	1063.	1026.	934.	913.	869.	896.	889.	937.	955.	1043.	1109.	976.6
1 HOUR PEAK MW	1077.	1058.	1022.	929.	908.	866.	892.	885.	931.	950.	1038.	1103.	971.6
ENERGY GWH	701.	642.	652.	597.	603.	577.	579.	593.	581.	629.	657.	699.	7513.0
ENERGY AV MW	942.	923.	877.	829.	811.	802.	778.	797.	807.	846.	912.	940.	855.3
*L.F. %	87.5	87.2	85.8	89.2	89.3	92.6	87.2	90.1	86.7	89.1	87.9	85.2	88.0
1993													
20 MIN PEAK MW	1111.	1089.	1051.	956.	936.	890.	917.	910.	959.	977.	1068.	1136.	999.9
1 HOUR PEAK MW	1104.	1083.	1047.	950.	930.	886.	914.	906.	954.	972.	1062.	1130.	994.9
ENERGY GWH	721.	638.	671.	614.	621.	594.	595.	611.	598.	647.	719.	779.6	7705.0
ENERGY AV MW	969.	949.	902.	852.	835.	825.	800.	821.	831.	870.	937.	967.	879.6
*L.F. %	87.8	87.6	86.2	89.7	89.7	93.1	87.6	90.6	87.1	89.5	88.2	85.6	88.4

* LOAD FACTOR BASED ON 1 HOUR PEAK

WEST SYSTEM ONTARIO PRIMARY DEMANDS
BASED ON THE LOAD FORECAST REPORT NO. 871214

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVERAGE OR TOTAL
1994													
20 MIN PEAK MW	1138.	1115.	1076.	978.	958.	911.	939.	932.	982.	1000.	1093.	1163.	1023.9
1 HOUR PEAK MW	1131.	1110.	1072.	973.	953.	908.	936.	928.	977.	994.	1088.	1157.	1019.0
ENERGY GWH	741.	655.	690.	630.	611.	611.	612.	628.	615.	664.	693.	738.	7914.8
ENERGY AV MW	996.	975.	927.	876.	858.	848.	822.	844.	854.	893.	962.	992.	903.5
*L.F. %	88.1	87.9	86.5	90.0	90.0	93.4	87.8	90.9	87.4	89.8	88.4	85.8	88.7
1995													
20 MIN PEAK MW	1162.	1138.	1098.	997.	978.	930.	959.	952.	1003.	1019.	1115.	1187.	1044.9
1 HOUR PEAK MW	1155.	1133.	1094.	992.	973.	927.	956.	948.	998.	1014.	1110.	1181.	1040.0
ENERGY GWH	759.	671.	706.	645.	654.	625.	626.	643.	630.	679.	709.	755.	8103.8
ENERGY AV MW	1021.	999.	949.	896.	879.	869.	842.	864.	874.	913.	984.	1015.	925.1
*L.F. %	88.4	88.2	86.8	90.4	90.3	93.7	88.1	91.2	87.6	90.1	88.7	86.0	89.0
1996													
20 MIN PEAK MW	1180.	1156.	1115.	1011.	994.	945.	974.	967.	1020.	1034.	1132.	1205.	1061.0
1 HOUR PEAK MW	1171.	1149.	1109.	1005.	988.	941.	970.	962.	1014.	1028.	1126.	1198.	1055.1
ENERGY GWH	772.	682.	718.	656.	666.	636.	637.	654.	640.	690.	720.	767.	8239.4
ENERGY AV MW	1038.	1015.	965.	911.	895.	884.	857.	879.	889.	928.	1000.	1032.	940.6
*L.F. %	88.6	88.4	87.0	90.6	90.5	93.9	88.3	91.4	87.8	90.3	88.8	86.1	89.1
1997													
20 MIN PEAK MW	1203.	1178.	1136.	1030.	1016.	965.	995.	988.	1042.	1054.	1155.	1230.	1082.8
1 HOUR PEAK MW	1195.	1172.	1131.	1024.	1010.	961.	991.	983.	1036.	1048.	1149.	1223.	1076.9
ENERGY GWH	788.	697.	733.	669.	680.	650.	651.	668.	654.	704.	735.	784.	8413.3
ENERGY AV MW	1060.	1037.	985.	929.	914.	903.	875.	898.	909.	946.	1021.	1053.	960.4
*L.F. %	88.7	88.5	87.1	90.7	90.5	94.0	88.3	91.4	87.7	90.3	88.9	86.1	89.2
1998													
20 MIN PEAK MW	1227.	1201.	1158.	1050.	1037.	985.	1016.	1009.	1065.	1075.	1178.	1255.	1104.6
1 HOUR PEAK MW	1218.	1195.	1153.	1044.	1031.	981.	1013.	1004.	1058.	1069.	1172.	1248.	1098.8
ENERGY GWH	804.	711.	747.	682.	694.	664.	665.	682.	668.	718.	750.	800.	8585.1
ENERGY AV MW	1081.	1058.	1004.	947.	933.	922.	893.	917.	928.	965.	1042.	1075.	980.0
*L.F. %	88.7	88.5	87.1	90.8	90.5	94.0	88.2	91.3	87.7	90.3	88.9	86.1	89.2
1999													
20 MIN PEAK MW	1252.	1225.	1182.	1070.	1059.	1006.	1038.	1030.	1087.	1096.	1202.	1281.	1127.4
1 HOUR PEAK MW	1243.	1219.	1177.	1064.	1053.	1002.	1034.	1025.	1081.	1090.	1196.	1274.	1121.6
ENERGY GWH	821.	726.	763.	697.	710.	679.	680.	698.	683.	734.	767.	818.	8775.1
ENERGY AV MW	1104.	1080.	1026.	967.	954.	943.	913.	938.	949.	987.	1065.	1099.	1001.7
*L.F. %	88.8	88.6	87.2	90.9	90.6	94.0	88.3	91.4	87.8	90.6	89.1	86.3	89.3
2000													
20 MIN PEAK MW	1278.	1251.	1206.	1093.	1083.	1028.	1061.	1053.	1112.	1119.	1228.	1310.	1151.9
1 HOUR PEAK MW	1269.	1245.	1201.	1086.	1077.	1025.	1057.	1048.	1106.	1113.	1222.	1303.	1146.1
ENERGY GWH	840.	742.	780.	713.	727.	695.	696.	714.	700.	751.	785.	837.	8979.0
ENERGY AV MW	1129.	1104.	1049.	990.	977.	965.	935.	960.	972.	1010.	1090.	1125.	1025.0
*L.F. %	89.0	88.7	87.3	91.1	90.7	94.2	88.4	91.6	87.9	90.7	89.2	86.4	89.4

* LOAD FACTOR BASED ON 1 HOUR PEAK

JAN 07/88

PAGE 3

WEST SYSTEM ONTARIO PRIMARY DEMANDS
BASED ON THE LOAD FORECAST REPORT NO. 871214

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVERAGE OR TOTAL
2001													
20 MIN PEAK MW	1311.	1284.	1238.	1121.	1112.	1056.	1089.	1081.	1142.	1149.	1261.	1345.	1182.3
1 HOUR PEAK MW	1301.	1276.	1232.	1114.	1104.	1051.	1085.	1076.	1135.	1142.	1254.	1337.	1175.5
ENERGY GWH	862.	762.	801.	731.	746.	713.	714.	733.	719.	772.	806.	860.	9221.0
ENERGY AV MW	1159.	1134.	1077.	1016.	1003.	991.	960.	986.	998.	1037.	1120.	1156.	1052.6
*L.F. %	89.1	88.9	87.4	91.2	90.8	94.3	88.5	91.6	88.0	90.8	89.3	86.5	89.5
2002													
20 MIN PEAK MW	1328.	1301.	1254.	1136.	1127.	1070.	1105.	1097.	1158.	1165.	1279.	1364.	1198.7
1 HOUR PEAK MW	1319.	1294.	1248.	1129.	1120.	1066.	1100.	1091.	1151.	1158.	1272.	1356.	1192.0
ENERGY GWH	875.	773.	813.	742.	757.	724.	725.	744.	729.	783.	818.	873.	9354.5
ENERGY AV MW	1176.	1151.	1092.	1030.	1017.	1005.	974.	1000.	1013.	1052.	1136.	1173.	1067.9
*L.F. %	89.1	88.9	87.5	91.3	90.8	94.3	88.5	91.7	88.0	90.8	89.3	86.5	89.6
2003													
20 MIN PEAK MW	1352.	1324.	1276.	1156.	1147.	1089.	1124.	1116.	1179.	1185.	1302.	1388.	1219.9
1 HOUR PEAK MW	1342.	1317.	1271.	1148.	1140.	1085.	1120.	1111.	1172.	1178.	1294.	1380.	1213.2
ENERGY GWH	890.	787.	827.	755.	771.	737.	738.	758.	742.	797.	833.	888.	9522.0
ENERGY AV MW	1197.	1171.	1112.	1049.	1036.	1024.	992.	1018.	1031.	1071.	1156.	1194.	1087.0
*L.F. %	89.2	88.9	87.5	91.3	90.8	94.3	88.5	91.7	88.0	90.9	89.3	86.5	89.6
2004													
20 MIN PEAK MW	1373.	1345.	1297.	1174.	1166.	1107.	1143.	1134.	1198.	1204.	1322.	1411.	1239.5
1 HOUR PEAK MW	1363.	1338.	1291.	1167.	1159.	1102.	1138.	1129.	1191.	1197.	1315.	1403.	1232.8
ENERGY GWH	905.	799.	841.	767.	783.	749.	750.	770.	755.	810.	846.	903.	9678.3
ENERGY AV MW	1216.	1189.	1130.	1066.	1053.	1041.	1008.	1035.	1048.	1088.	1175.	1214.	1104.8
*L.F. %	89.2	88.9	87.5	91.3	90.9	94.4	88.6	91.7	88.0	90.9	89.4	86.5	89.6
2005													
20 MIN PEAK MW	1390.	1361.	1312.	1188.	1180.	1121.	1157.	1148.	1213.	1219.	1338.	1428.	1254.5
1 HOUR PEAK MW	1380.	1354.	1307.	1181.	1173.	1116.	1152.	1143.	1206.	1212.	1331.	1420.	1247.8
ENERGY GWH	917.	810.	852.	777.	794.	759.	760.	780.	765.	820.	857.	915.	9805.6
ENERGY AV MW	1232.	1206.	1145.	1079.	1067.	1054.	1021.	1049.	1062.	1102.	1191.	1229.	1119.4
*L.F. %	89.3	89.1	87.6	91.4	90.9	94.4	88.6	91.8	88.1	91.0	89.4	86.6	89.7
2006													
20 MIN PEAK MW	1412.	1383.	1333.	1207.	1199.	1139.	1176.	1167.	1233.	1238.	1360.	1451.	1274.9
1 HOUR PEAK MW	1403.	1376.	1328.	1200.	1193.	1135.	1171.	1162.	1226.	1231.	1353.	1443.	1268.3
ENERGY GWH	931.	823.	865.	790.	807.	771.	772.	793.	777.	833.	871.	930.	9964.5
ENERGY AV MW	1252.	1225.	1163.	1097.	1084.	1071.	1038.	1066.	1079.	1120.	1210.	1249.	1137.5
*L.F. %	89.3	89.0	87.6	91.4	90.9	94.4	88.6	91.8	88.0	91.0	89.4	86.6	89.7
2007													
20 MIN PEAK MW	1431.	1401.	1351.	1223.	1216.	1154.	1191.	1183.	1249.	1254.	1378.	1470.	1291.8
1 HOUR PEAK MW	1421.	1394.	1345.	1215.	1209.	1150.	1187.	1177.	1242.	1247.	1371.	1462.	1285.2
ENERGY GWH	944.	835.	877.	800.	818.	782.	783.	804.	788.	845.	883.	942.	10100.6
ENERGY AV MW	1269.	1242.	1179.	1112.	1099.	1086.	1052.	1081.	1094.	1135.	1226.	1267.	1153.0
*L.F. %	89.3	89.1	87.6	91.5	90.9	94.5	88.6	91.8	88.1	91.0	89.5	86.6	89.7

* LOAD FACTOR BASED ON 1 HOUR PEAK

WEST SYSTEM ONTARIO PRIMARY DEMANDS
BASED ON THE LOAD FORECAST REPORT NO. 871214

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVERAGE OR TOTAL
2008													
20 MIN PEAK MW	1451.	1420.	1369.	1239.	1232.	1170.	1208.	1199.	1267.	1271.	1397.	1491.	1309.5
1 HOUR PEAK MW	1441.	1413.	1364.	1232.	1225.	1166.	1204.	1194.	1260.	1264.	1390.	1483.	1302.9
ENERGY GWH	958.	845.	889.	812.	829.	793.	794.	815.	799.	856.	895.	956.	10242.6
ENERGY AV MW	1287.	1258.	1195.	1127.	1115.	1102.	1067.	1096.	1110.	1151.	1244.	1284.	1169.2
W.L.F. %	89.3	89.0	87.7	91.5	91.0	94.5	88.7	91.8	88.1	91.1	89.5	86.6	89.7
2009													
20 MIN PEAK MW	1469.	1439.	1387.	1255.	1248.	1185.	1224.	1215.	1283.	1287.	1414.	1510.	1326.4
1 HOUR PEAK MW	1458.	1431.	1380.	1247.	1241.	1180.	1219.	1208.	1276.	1280.	1406.	1501.	1318.9
ENERGY GWH	970.	858.	901.	822.	840.	804.	805.	826.	810.	868.	907.	968.	10378.8
ENERGY AV MW	1304.	1276.	1211.	1142.	1130.	1116.	1082.	1111.	1125.	1166.	1260.	1301.	1184.8
W.L.F. %	89.4	89.2	87.7	91.6	91.1	94.6	88.8	91.9	88.2	91.2	89.6	86.7	89.8
2010													
20 MIN PEAK MW	1490.	1459.	1406.	1272.	1266.	1202.	1241.	1232.	1302.	1305.	1434.	1531.	1345.1
1 HOUR PEAK MW	1479.	1451.	1400.	1264.	1258.	1197.	1236.	1226.	1294.	1297.	1426.	1522.	1337.6
ENERGY GWH	964.	870.	914.	834.	852.	815.	816.	838.	821.	880.	920.	982.	10525.5
ENERGY AV MW	1322.	1294.	1228.	1158.	1146.	1132.	1097.	1126.	1141.	1183.	1278.	1320.	1201.5
W.L.F. %	89.4	89.2	87.7	91.6	91.0	94.6	88.7	91.9	88.2	91.1	89.6	86.7	89.8

* LOAD FACTOR BASED ON 1 HOUR PEAK

3.0 PERFORMANCE OF LOAD FORECAST 871214 in 1987

3.1 Actual Primary Demand Versus Forecast

The Short-Term Primary Load Forecast (871214) was prepared using regional estimates commencing January 1987. Since no 1987 actual data are used in this key component of the forecast process, it is worthwhile monitoring current year actuals to see how well the forecast is tracking. This section compares the forecast of system demand and customer loads with the actuals for 1987.

Table 3.1: Actual Total System Primary Demand Versus Forecast

	1-Hour Peak - GW					Energy - TW.h				
	Actual		Yr/Yr Growth	Forecast		Actual		Yr/Yr Growth	Forecast	
	1986	1987		871214	% Dev. *	1986	1987		871214	% Dev. *
Jan	20.6	20.3	-1.3	20.9	-2.9	11.9	11.9	0.0	12.2	-2.7
Feb	19.5	20.4	4.8	20.1	1.4	10.7	10.9	2.1	10.8	1.5
Mar	19.4	19.4	0.3	19.9	-2.3	10.9	11.1	2.2	11.5	-3.4
Apr	16.9	17.9	6.2	17.6	1.7	9.5	9.7	2.9	9.9	-1.3
May	15.9	17.2	7.9	16.6	3.5	9.2	9.6	3.7	9.6	-0.3
Jun	15.9	17.9	12.7	17.0	5.0	8.8	9.9	12.0	9.4	5.4
Jul	16.9	18.2	7.8	17.2	5.7	9.4	10.3	9.8	9.6	7.0
Aug	16.4	18.5	12.6	17.4	6.3	9.2	10.0	8.4	9.9	0.9
Sept	15.8	16.5	4.5	17.2	-3.9	9.1	9.5	4.5	9.5	0.5
Oct	16.7	17.8	6.6	17.4	2.4	9.8	10.5	6.9	10.1	4.1
Nov	19.0	19.7	3.7	19.7	0.1	10.6	11.0	4.2	10.9	1.8
Dec	20.5	20.4	-0.4	21.3	-4.1	11.4	11.9	4.5	11.9	0.0
Avg	17.8	18.7	5.1**	18.5	0.8**	120.6 ⁺	126.5 ⁺	4.9**	125.2 ⁺	1.0**

* Per cent deviation from forecast.

** Based on annual average

+ Total

The hot and humid weather during the summer of 1987 resulted in a higher-than-forecast peak for the months of May through August. In September, the peak forecast for air-conditioning never materialized due to the unusually cold weather. On the other hand, the December forecast for peak heating load was never attained because of the mild weather. The month of October was cooler than expected, thus recording a higher-than-forecast energy load. In addition to these unexpected weather variations, the actual economic growth of 4.9% was higher than the 3.5% economic growth forecast of September 1987. The strong increase in residential housing starts and commercial construction in 1987 was an important factor contributing to the higher-than-forecast energy load.

3.2 Weather-Corrected Primary Demand Versus Forecast

As Load Forecast 871214 assumed normal weather in estimating one-hour peak and energy, weather-corrected load data for 1987 really provide a better test of forecast performance than actual data which, as noted above, are subject to a variety of weather influences. Weather had little effect on the accuracy of the peak forecast in 1987, but, as Table 3.2 indicates, energy demand on a weather-corrected basis was 1.9% above the forecast. This is about 1% higher than indicated by the actual data and may more closely reflect the difference between the predicted and actual economic growth in Ontario for 1987.

Table 3.2: Weather-Corrected Total System Primary Demand Versus Forecast

	1-Hour Peak - GW					Energy - TW.h				
	Weather Corrected Demand		% Yr/Yr Growth	1987 Forecast		Weather Corrected Demand		% Yr/Yr Growth	1987 Forecast	
	1986	1987		871214	% Dev. *	1986	1987		871214	% Dev. *
Jan	20.7	21.1	2.1	20.9	1.0	12.0	12.2	1.7	12.2	-0.1
Feb	19.9	20.7	3.6	20.1	2.7	10.7	11.0	3.2	10.8	2.2
Mar	18.6	19.2	3.4	19.9	-3.2	11.0	11.4	4.0	11.5	-0.4
Apr	17.2	17.8	3.5	17.6	1.3	9.7	10.0	3.8	9.9	1.7
May	16.0	16.5	3.1	16.6	-0.5	9.3	9.6	2.9	9.6	-0.2
Jun	16.2	17.3	6.7	17.0	1.5	9.0	9.7	8.3	9.4	3.5
Jul	16.4	17.4	6.5	17.2	1.2	9.3	10.0	7.6	9.6	4.0
Aug	16.3	17.4	6.8	17.4	0.1	9.3	10.0	7.6	9.9	1.0
Sept	16.3	17.1	4.9	17.2	-0.6	9.2	9.7	5.4	9.5	2.2
Oct	16.9	17.7	4.4	17.4	1.7	9.9	10.4	4.7	10.1	2.8
Nov	19.1	20.5	7.4	19.7	3.9	10.4	11.1	6.7	10.9	2.7
Dec	20.2	21.4	5.6	21.3	0.2	11.6	12.3	5.8	11.9	3.4
Avg	17.8	18.7	4.8**	18.5	0.8**	121.5 ⁺	127.6 ⁺	5.0**	125.2 ⁺	1.9**

* Per cent deviation from forecast.

** Based on annual average

+ Total

3.3 Diversity and Losses

System customers are billed on their maximum monthly peak load, whenever in the month it may occur (the non-coincident peak load). This quantity will be equal to or greater than that customer's load at the time of system peak (the coincident load). Diversity is defined as the coincident load minus the non-coincident peak load. It is, therefore, zero or negative because diversity reduces system peak demand. Diversity for individual system customers can only be measured at the time of system peak.

System peak losses are the difference between system peak and the sum of customers coincident loads, and system energy losses are the difference between energy sent out by the system and that received by the customers. It is not possible to allocate losses to individual customers. Losses are positive because they increase system demand. For peak demands, the term net diversity and loss refers to the sum of the two.

Relationship Between System Demands and Customer Loads - 1987

The performance of Forecast 871214 on an average monthly basis was as follows:

Table 3.3: Performance of Forecast 871214

Average, Peak MW	Actual		Increase		1987 Forecast #871214	Deviation from Forecast	
	1986	1987	MW	%		MW	%
System Demand	17786	18690	904	5.1	18534	156	0.8
Customer Loads	18180	19110	930	5.1	18897	213	1.1
Net Diversity & Loss	-394	-420	-26	6.6	-363	-57	15.7
% Customer Loads	-2.2	-2.2			-1.9		
Energy TW.h							
System Demand	120.6	126.5	5.9	4.9	125.2	1.2	1.0
Customer Loads	115.3	121.0	5.7	4.9	119.8	1.2	1.0
Loss	5.3	5.5	0.2	3.8	5.4	0.0	0.0
% Customer Loads	4.6	4.5			4.5		

* 1 Hour

Line losses in percent of customers peak and energy were very close to forecast, 4.5 and -2.2 compared to 4.5 and -1.9, respectively.

3.4 Unallocated Load

Since the forecast is the sum of the Regional estimates and the unallocated load that is eventually decided upon, the "actual" unallocated load is that which would have reduced the forecast error to zero.

Table 3.4: Average Monthly Results for 1987

<u>Unallocated Load</u>	<u>Peak MW</u>	<u>Energy Av.MW</u>
Forecast	+18	+16
"Actual"	+231	+153
Error (Actual-Forecast)	+213	+137

3.5 Detail of Customer Loads

(1) By Class

The monthly average results in terms of growth from 1986 and deviation from forecast are shown below:

Table 3.5.1: Sum of Customers' Loads (By Class) - 1987

<u>1987 Average</u>		<u>Increase Over 1986</u>		<u>Deviation From F/C No. 871214</u>		<u>Unallocated Load Forecast</u>
		MW	%	MW	%	MW
Total	- Peak	930	5.1	213	1.1	-18.5
	- Energy	643	4.9	137	1.0	-15.8
Municipal	- Peak	596	4.8	163	1.3	-46.9
	- Energy	408	4.5	99	1.1	-34.5
Retail	- Peak	132	4.6	17	0.6	-2.6
	- Energy	59	3.2	-12	-0.6	-1.6
Direct	- Peak	202	7.1	32	1.1	31
	- Energy	176	7.8	50	2.1	20.4

(2) By Region

Table 3.5.2: Sum of Customers' Loads (By Regions) - 1987

<u>1987 Average</u>		<u>Increase Over 1986</u>		<u>Deviation From F/C No. 871214</u>		<u>Unallocated Load Forecast</u>
		MW	%	MW	%	MW
Total	- Peak	930	5.1	213	1.1	-18.5
	- Energy	643	4.9	137	1.0	-15.8
Central	- Peak	485	5.7	117	1.3	-34.1
	- Energy	339	5.5	71	1.1	-26.2
Western	- Peak	155	4.2	66	1.7	19.5
	- Energy	103	3.8	34	1.2	13.1
Eastern	- Peak	111	4.5	-9	-0.4	-2.7
	- Energy	63	3.7	-9	-0.5	-1.8
Geo. Bay	- Peak	65	6.1	18	1.6	-1.1
	- Energy	37	5.1	20	2.7	-0.8
N.Eastern	- Peak	86	5.6	22	1.4	0
	- Energy	74	6.5	17	1.4	0
N.Western	- Peak	28	3.1	-3	-0.3	0
	- Energy	28	4.0	6	0.8	0

Reasons for varying growth rates over 1986 and deviation from forecast are diverse, but may generally be related to economic conditions in 1987.

Further chronological and regional class detail are available in the attached tables.

COMPARISON OF ACTUAL AND ESTIMATED ONTARIO PRIMARY 1-HOUR PEAK DEMANDS
 BASED ON THE 1987 SHORT-TERM LOAD FORECAST
 FOR THE PERIOD FROM JAN 1987 TO DEC 1987
 % ERROR=(ACTUAL-FORECAST)/FORECAST*100.0

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TO DATE
NIAGARA 1987 ACT. EST.	88 85 3.53	77 85 -9.41	80 85 -5.00	81 85 -4.71	73 85 -14.12	77 85 -9.41	77 84 -8.33	65 85 -23.53	66 85 -22.35	64 86 -25.58	63 84 -25.00	65 83 -21.69	-13.86
NORTHEAST 1987 ACT. EST.	40 39 2.56	29 36 -19.44	32 36 -11.11	38 36 5.56	36 37 -2.70	35 37 -5.41	31 36 -13.89	33 36 -8.33	39 37 5.41	43 37 16.22	39 37 5.41	39 37 5.41	-1.59
EAST SYSTEM 1987 ACT. EST.	19215 19887 -3.38	19341 19114 1.19	18433 18859 -2.26	16944 16714 1.38	16318 15715 3.84	16992 16139 5.29	17318 16355 5.89	17623 16516 6.70	15635 16268 -3.89	16866 16418 2.73	18717 18694 .12	19423 20235 -4.01	.91
EAST SYSTEM TOTAL 1987 ACT. EST.	19309 19981 -3.36	19432 19205 1.18	18521 18950 -2.26	17035 16805 1.37	16399 15807 3.75	17093 16231 5.31	17399 16445 5.80	17788 16607 6.63	15723 16360 -3.89	16952 16511 2.67	18788 18785 .02	19505 20325 -4.03	.87
WEST SYSTEM 1987 ACT. EST.	1015 1004 1.10	958 992 -3.43	934 961 -2.81	892 875 1.94	876 852 2.82	838 818 2.44	840 829 1.33	840 833 .84	838 863 -2.90	892 894 -.22	960 972 -1.23	969 1030 -5.92	-.65
ALL SYSTEM 1987 ACT. EST.	20324 20941 -2.95	20390 20111 1.39	19418 19876 -2.30	17904 17607 1.69	17199 16622 3.47	17897 17042 5.02	18195 17215 5.69	18502 17399 6.34	16479 17150 -3.91	17812 17389 2.43	19717 19741 -.12	20448 21314 -4.06	.84

COMPARISON OF ACTUAL AND ESTIMATED ONTARIO PRIMARY ENERGY DEMANDS
 BASED ON THE 1987 SHORT-TERM LOAD FORECAST
 FOR THE PERIOD FROM JAN 1987 TO DEC 1987
 % ERROR=(ACTUAL-FORECAST)/FORECAST*100.0

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TO DATE
NIAGARA 1987 ACT. EST.	25 HZ 61 61 .00	62 62 .00	58 62 -6.45	61 61 .00	56 61 -8.20	58 61 -4.92	52 59 -11.86	49 60 -18.33	51 60 -15.00	50 61 -18.03	58 60 -16.67	48 59 -18.64	-9.86
NORTHEAST 1987 ACT. EST.	25 HZ 30 27 11.11	23 26 -11.54	27 25 8.00	25 25 .00	28 26 7.69	28 25 12.00	23 25 -8.00	23 25 -8.00	32 25 28.00	33 25 32.00	29 26 11.54	29 26 11.54	7.95
EAST SYSTEM 1987 ACT. EST.	60 HZ 15070 15688 -2.78	15398 15145 1.67	14035 14581 -3.74	12686 12876 -1.48	12031 12114 -5.52	12900 12205 5.69	13025 12181 6.93	12644 12543 .81	12462 12384 .63	13259 12704 4.37	14451 14175 1.95	15101 15076 .18	.99
EAST SYSTEM TOTAL 1987 ACT. EST.	15161 15576 -2.66	15483 15233 1.64	14121 14668 -3.73	12772 12962 -1.47	12135 12281 -5.54	12985 12291 5.65	13100 12265 6.81	12716 12628 .70	12545 12469 .61	13341 12790 4.31	14530 14261 1.89	15179 15159 .13	.95
WEST SYSTEM 1987 ACT. EST.	816 842 -3.09	806 821 -1.83	800 775 3.23	759 745 1.88	751 725 3.59	734 720 1.94	757 688 10.03	752 716 5.03	695 711 -2.25	767 741 .79	817 815 .25	823 840 -2.02	1.32
ALL SYSTEM 1987 ACT. EST.	15977 16418 -2.69	16289 16054 1.46	14920 15443 -3.39	13531 13787 -1.28	12886 12925 -.30	12718 13011 -2.25	13858 12954 6.98	13468 13364 .93	13240 13180 .46	14188 13551 4.11	15346 15076 1.79	16002 15999 .02	.39

COMPARISON OF ACTUAL AND ESTIMATED CUSTOMERS LOADS BASED ON THE 1987 LOAD FORECAST

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVERAGE
MUNIC													
1986	14024	13355	13140	11640	11868	11646	12366	11896	11478	11465	13046	13977	12492
1987	13880	13975	13176	12186	12643	13020	13415	13273	11821	12121	13483	14061	13088
% GR.	-1.03	4.64	28	4.70	6.53	11.80	8.48	11.57	2.99	5.73	3.35	14.61	4.77
FCST	14330	13808	13537	12149	11655	12296	12569	12555	12335	11918	13461	14485	12925
% DEV	-3.14	1.21	-2.66	.31	8.48	5.88	6.73	5.71	-4.17	1.71	.17	-2.93	1.26
ENERGY													
1986	10413	10428	9495	8653	8155	8191	8630	8236	8335	8563	9580	10003	9050
1987	10426	10632	9687	8781	8479	9187	9450	8897	8657	9098	9932	10348	9458
% GR.	12	1.95	2.01	1.49	3.97	12.16	9.51	8.03	3.86	6.25	3.67	3.45	4.52
FCST	10705	10485	10096	8897	8449	8563	8699	8846	8604	8789	9828	10408	9359
% DEV	-2.61	1.40	-4.05	-1.29	.36	7.29	8.64	.57	.61	3.51	1.06	-5.58	1.06
RETAIL													
1986	3732	3444	3463	2692	2529	2159	2133	2183	2328	2693	3241	3597	2849
1987	3806	3739	3427	2874	2487	2249	2289	2341	2326	2903	3426	3906	2981
% GR.	2.00	8.58	-1.06	6.76	-1.67	4.19	7.33	7.27	-.08	7.78	5.73	8.61	4.63
FCST	3809	3572	3513	2860	2606	2280	2258	2329	2439	2810	3273	3814	2964
% DEV	-.07	4.69	-2.46	.48	-4.56	-1.36	1.37	.55	-4.65	3.29	4.69	2.43	.59
ENERGY													
1986	2533	2475	2148	1698	1465	1396	1434	1449	1495	1689	2111	2395	1854
1987	2518	2520	2123	1713	1526	1492	1545	1524	1528	1849	2153	2499	1913
% GR.	-.60	1.83	-1.17	.90	4.11	6.81	7.78	5.16	2.18	9.47	2.00	4.31	3.16
FCST	2617	2453	2282	1826	1590	1471	1481	1524	1537	1722	2123	2502	1925
% DEV	-3.80	2.72	-6.98	-6.18	-4.04	1.40	4.38	.01	-.60	7.39	1.41	-1.15	-.63
DIRECT													
1986	2865	2876	2859	2789	2769	2770	2628	2780	2878	2928	2966	2965	2839
1987	2984	2909	2960	3030	3020	3053	2981	3063	3158	3148	3084	3100	3061
% GR.	4.16	1.15	3.55	8.65	9.08	10.20	13.41	10.17	9.72	7.53	4.00	4.57	7.10
FCST	2950	2956	2982	2988	2892	3053	2927	3012	3105	3085	3088	3064	3009
% DEV	1.16	-1.60	-.72	1.40	4.44	-.01	1.84	1.69	1.69	2.04	-.12	1.20	1.07
ENERGY													
1986	2325	2347	2325	2295	2239	2137	2039	2159	2279	2367	2380	2257	2261
1987	2380	2433	2471	2435	2349	2433	2232	2439	2479	2552	2563	2483	2437
% GR.	2.45	3.66	6.27	6.10	4.94	13.89	9.46	12.99	8.76	7.82	7.68	10.02	7.77
FCST	2386	2412	2408	2405	2304	2426	2148	2361	2436	2474	2496	2395	2387
% DEV	-.25	.87	2.60	1.26	1.98	.32	3.91	3.29	1.77	3.13	2.67	3.65	2.10
TOTAL													
1986	20620	19675	19462	17120	17166	16575	17127	16859	16884	17085	19253	20538	18180
1987	20620	20623	19563	18090	18151	18322	18685	18677	17304	18172	19994	21068	19110
% GR.	24	4.82	52	5.67	9.74	10.54	9.09	10.78	3.72	6.36	3.85	2.58	5.11
FCST	21088	20337	20031	17997	17153	17830	17754	17896	17880	17813	19822	21362	18897
% DEV	-1.98	1.41	-2.34	.52	5.82	3.93	5.24	4.37	-3.22	2.01	.87	-1.38	1.13
ENERGY													
1986	15270	15250	13968	12645	11959	11724	12103	11843	12110	12618	14071	14655	13165
1987	15324	15585	14280	12930	12354	13112	13228	12860	12664	13498	14648	15329	13808
% GR.	35	2.20	2.23	2.25	4.17	11.84	9.30	8.58	4.57	6.97	4.10	4.60	4.88
FCST	15708	15351	14785	13127	12342	12460	12327	12731	12577	12985	14447	15306	13671
% DEV	-2.45	1.53	-3.42	-1.51	.09	5.24	7.31	1.01	.69	3.95	1.39	15	1.4

COMPARISON OF ACTUAL AND ESTIMATED CUSTOMERS LOADS BASED ON THE 1987 LOAD FORECAST

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVERAGE
MUNIC													
1986	13719.	13075.	12862.	11411.	11646.	11449.	12171.	11702.	11278.	11235.	12764.	13674.	12249.
1987	13574.	13711.	12923.	11950.	12421.	12815.	13213.	13076.	11619.	11892.	13213.	13778.	12849.
% GR.	-1.05	4.86	4.72	6.66	6.66	11.93	8.56	11.74	3.03	5.85	3.51	7.6	4.90
FCST	14022.	13521.	13262.	11917.	11434.	12098.	12374.	12358.	12127.	11687.	13178.	14166.	12678.
% DEV	-3.20	1.41	-2.56	.28	8.63	5.93	6.78	5.81	-4.18	1.76	.27	-2.74	1.34
ENERGY AV MW													
1986	10196.	10221.	9314.	8490.	8006.	8052.	8493.	8104.	8202.	8400.	9376.	9792.	8880.
1987	10216.	10338.	9507.	8621.	8327.	9040.	9313.	8764.	8515.	8929.	9738.	10135.	9289.
% GR.	.20	2.12	2.07	1.55	4.01	12.28	9.66	8.15	3.82	6.30	3.85	3.50	4.61
FCST	10486.	10286.	9910.	8736.	8295.	8422.	8562.	8711.	8466.	8624.	9629.	10182.	9188.
% DEV	-2.57	1.45	-4.06	-1.32	.38	7.35	8.78	.61	.58	3.53	1.12	-4.6	1.11
RETAIL													
1986	3544.	3267.	3298.	2561.	2400.	2047.	2028.	2077.	2211.	2554.	3076.	3423.	2707.
1987	3616.	3571.	3265.	2736.	2348.	2135.	2179.	2233.	2210.	2756.	3289.	3717.	2836.
% GR.	2.02	9.30	-1.00	6.81	-2.15	4.27	7.46	7.47	-0.5	7.89	6.27	8.59	4.76
FCST	3608.	3378.	3337.	2718.	2467.	2155.	2145.	2212.	2309.	2662.	3098.	3622.	2809.
% DEV	.21	5.72	-2.16	.64	-4.81	-9.5	1.59	.93	-4.31	3.51	5.53	2.62	.95
ENERGY AV MW													
1986	2412.	2355.	2040.	1608.	1388.	1325.	1364.	1379.	1418.	1602.	1997.	2275.	1761.
1987	2392.	2402.	2016.	1627.	1445.	1417.	1472.	1452.	1453.	1755.	2045.	2376.	1818.
% GR.	-83	2.01	-1.21	1.17	4.12	6.94	7.91	5.32	2.46	9.54	2.39	4.44	3.27
FCST	2474.	2318.	2163.	1733.	1503.	1391.	1405.	1446.	1455.	1629.	2005.	2369.	1822.
% DEV	-3.35	3.63	-6.79	-6.10	-3.82	1.89	4.77	.40	-1.14	7.71	1.99	.28	-22
DIRECT													
1986	2346.	2358.	2347.	2286.	2257.	2253.	2119.	2265.	2364.	2414.	2449.	2453.	2326.
1987	2464.	2385.	2437.	2501.	2475.	2493.	2415.	2505.	2603.	2601.	2545.	2566.	2499.
% GR.	5.00	1.14	3.83	9.39	9.68	10.62	13.99	10.61	10.12	7.74	3.91	4.59	7.45
FCST	2431.	2434.	2454.	2459.	2361.	2521.	2404.	2479.	2582.	2553.	2556.	2532.	2481.
% DEV	1.35	-2.02	-68	1.69	4.85	-1.13	.45	1.07	.79	1.89	-46	1.33	.75
ENERGY AV MW													
1986	1884.	1896.	1897.	1865.	1794.	1694.	1598.	1706.	1838.	1910.	1935.	1828.	1820.
1987	1929.	1966.	1996.	1972.	1875.	1949.	1755.	1939.	2025.	2092.	2085.	2035.	1968.
% GR.	2.38	3.69	5.23	5.74	4.48	15.07	9.80	13.66	10.18	9.53	7.76	11.31	8.14
FCST	1946.	1955.	1968.	1949.	1854.	1961.	1704.	1898.	1988.	2009.	2029.	1956.	1934.
% DEV	-90	.56	1.42	1.19	1.13	-62	2.95	2.13	1.88	4.10	2.77	4.01	1.73
TOTAL													
1986	19609.	18701.	18507.	16258.	16303.	15750.	16317.	16044.	15852.	16203.	18290.	19550.	17282.
1987	19653.	19668.	18625.	17186.	17245.	17442.	17807.	17813.	16432.	17249.	19027.	20061.	18184.
% GR.	.23	5.17	64	5.71	5.78	10.75	9.13	11.03	3.66	6.45	4.03	2.61	5.22
FCST	20061.	19333.	19053.	17095.	16262.	16774.	16923.	17048.	17018.	16902.	18832.	20320.	17968.
% DEV	-2.03	1.73	-2.25	.54	6.04	3.98	5.22	4.49	-3.44	2.05	1.04	-1.28	1.20
ENERGY AV MW													
1986	14492.	14472.	13251.	11963.	11189.	11071.	11456.	11189.	11458.	11911.	13308.	13895.	12460.
1987	14537.	14805.	13519.	12220.	11647.	12407.	12541.	12155.	11993.	12775.	13867.	14546.	13075.
% GR.	.31	2.30	2.02	2.15	4.10	12.07	9.47	8.64	4.68	7.25	4.20	4.68	4.93
FCST	14906.	14561.	14040.	12418.	11652.	11774.	11672.	12056.	11909.	12263.	13663.	14508.	12944.
% DEV	-2.48	1.68	-3.71	-1.59	-.04	5.37	7.44	.83	.71	4.18	1.49	.27	1.01

LISTING OF FORECAST PEAK % ERROR BY CLASS AND REGION
 BASED ON THE 1987 LOAD FORECAST
 FOR THE PERIOD FROM JAN 1987 TO DEC 1987
 % ERROR=(ACTUAL-FORECAST)/FORECAST*100.0

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVER PEAK
MUNIC													
CENT.	-3.68	1.37	-2.58	-1.15	10.05	6.44	7.04	6.02	-4.88	1.63	1.09	-3.30	1.44
WEST.	-2.42	.96	-1.72	.57	12.65	7.12	6.91	5.08	-3.56	.84	-2.59	-2.76	1.80
EAST.	-2.77	.63	-3.78	1.78	1.54	2.79	6.42	6.41	-1.79	2.65	-2.41	-2.95	.57
GEOG.	-2.01	4.76	-1.31	-7.8	-4.76	1.83	4.63	5.32	-1.98	5.47	2.05	-1.86	.80
N.E.	-.61	4.01	-3.54	3.74	-5.23	1.73	1.93	2.94	-3.38	1.67	-.06	-2.51	-.06
N.W.	-.56	-8.34	-7.73	2.02	.78	3.37	3.18	-.23	-3.57	-.85	-4.61	-11.16	-2.92
EAST SYSTEM	-3.20	1.41	-2.56	.28	8.63	5.93	6.78	5.81	-4.18	1.76	.27	-2.74	1.34
ALL SYSTEMS	-3.14	1.21	-2.66	.31	8.48	5.88	6.73	5.71	-4.17	1.71	.17	-2.93	1.26
DIRECT													
CENT.	-1.14	-.76	1.27	-.37	.92	-5.19	-10.59	-8.26	-7.58	-8.38	-6.87	-6.95	-4.82
WEST.	4.97	-1.67	-1.00	5.57	3.09	-.19	4.33	3.15	-1.66	-.61	-3.16	-1.69	-.91
EAST.	-1.81	-1.44	-1.55	-4.23	-3.68	-1.92	-2.89	-1.42	-3.32	-2.80	-3.28	-1.40	-2.49
GEOG.	-5.60	-6.00	2.76	6.02	7.46	-.42	.29	.85	2.94	.79	1.13	2.62	.82
N.E.	.03	-2.37	-.82	-.37	10.93	-.99	.20	2.07	6.71	8.93	4.70	7.29	3.01
N.W.	.28	.38	-.93	-.05	2.58	5.29	8.25	4.58	6.11	2.78	1.51	.57	2.62
EAST SYSTEM	1.35	-2.02	-.68	1.69	4.85	-1.13	.45	1.07	.79	1.89	-.46	1.33	.75
ALL SYSTEMS	1.16	-1.60	-.72	1.40	4.44	-.01	1.84	1.69	1.69	2.04	-.12	1.20	1.07
AREAS													
CENT.	2.16	5.27	-5.55	-.04	-7.88	1.95	1.10	3.28	-6.10	3.59	9.47	8.95	1.74
WEST.	-.02	6.17	4.57	5.44	.13	3.00	11.56	3.95	-1.63	3.33	-1.68	.58	2.83
EAST.	-2.09	3.37	-4.84	-3.52	-6.89	-4.28	-1.36	-2.22	-4.93	1.35	7.33	-.86	-1.28
GEOG.	1.40	9.65	-.70	1.86	-6.60	-5.09	-4.71	-.69	-4.30	8.10	13.06	9.38	2.62
N.E.	.51	4.72	-3.77	.64	-1.80	-1.17	-1.75	-.22	-5.41	1.20	-1.72	-5.09	-1.03
N.W.	-5.08	-13.57	-8.13	-2.54	-.03	-8.43	-2.72	-6.62	-10.83	-.70	-10.19	-1.35	-6.00
EAST SYSTEM	.21	5.72	-2.16	.64	-4.81	-.95	1.59	.93	-4.31	3.51	5.53	2.62	.95
ALL SYSTEMS	-.07	4.69	-2.46	.48	-4.56	-1.36	1.37	.55	-4.65	3.29	4.69	2.43	.59
TOTAL													
CENT.	-3.22	1.60	-2.71	-.14	8.79	5.95	6.33	5.53	-5.01	1.68	1.44	-2.53	1.32
WEST.	-.30	1.23	-.47	2.65	8.21	4.60	6.90	4.41	-2.77	.85	-2.58	-2.74	1.74
EAST.	-2.46	1.24	-3.86	-.56	-1.56	-1.36	3.14	3.10	-2.84	1.52	1.53	-2.13	-.34
GEOG.	-.53	6.40	-.70	1.09	-5.01	-.47	-.01	2.11	-2.51	6.32	7.19	4.11	1.68
N.E.	.04	.84	-2.17	.62	4.89	-1.39	.04	1.79	2.44	5.79	2.07	1.37	1.41
N.W.	-1.02	-4.78	-4.14	.15	1.73	2.84	5.56	1.92	1.21	1.29	-2.31	-3.37	-.28
EAST SYSTEM	-2.03	1.73	-2.25	.54	6.04	3.98	5.22	4.49	-3.44	2.05	1.04	-1.28	1.23
ALL SYSTEMS	-1.98	1.41	-2.34	.52	5.82	3.93	5.24	4.37	-3.22	2.01	.87	-1.38	1.22

LISTING OF FORECAST ENERGY % ERROR BY CLASS AND REGION
 BASED ON THE 1987 LOAD FORECAST
 FOR THE PERIOD FROM JAN 1987 TO DEC 1987
 % ERROR=(ACTUAL-FORECAST)/FORECAST*100.0

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
MUNIC													
CENT.	-2.63	1.49	-3.60	-73	.24	7.26	9.11	.41	.26	3.28	1.57	.09	1.26
WEST.	-2.61	.93	-3.23	-77	2.14	9.86	8.98	.34	.48	2.49	-1.60	-.59	1.22
EAST.	-1.71	.89	-6.80	-4.39	-.61	4.49	6.67	.82	2.00	4.15	1.95	-2.67	.10
GEORG.	-1.78	3.39	-3.98	-2.58	-1.06	7.15	9.11	5.14	2.76	9.18	2.94	.22	2.09
N.E.	-5.96	3.58	-8.32	-4.74	-1.78	3.65	6.41	1.77	.86	7.28	1.75	-3.33	-.58
N.W.	-4.40	-1.18	-3.59	-.12	-1.05	3.84	.26	-1.89	2.49	2.36	-2.07	-5.99	-1.36
EAST SYSTEM	-2.57	1.45	-4.06	-1.32	.38	7.35	8.78	.61	.58	3.53	1.12	-.46	1.11
ALL SYSTEMS	-2.61	1.40	-4.05	-1.29	.36	7.29	8.64	.57	.61	3.51	1.06	-.58	1.06
DIRECT													
CENT.	-9.02	-2.29	9.30	-3.50	.17	7.09	-3.48	8.45	-.64	-2.28	-1.82	-2.34	-.06
WEST.	-.06	1.02	1.70	2.36	-3.65	-.38	3.99	.28	1.12	1.00	-2.44	-2.30	.20
EAST.	1.03	4.44	2.52	-1.02	-1.58	-1.61	2.51	2.34	2.23	2.39	2.28	3.93	1.59
GEORG.	4.54	5.50	7.50	5.92	-4.65	-6.23	-.44	7.71	1.52	6.94	7.73	5.75	3.87
N.E.	-1.71	-1.20	-.98	1.11	8.19	-1.30	3.47	2.35	3.06	8.87	8.61	11.54	3.48
N.W.	2.59	2.20	7.89	1.54	5.45	4.28	7.60	8.08	1.28	-1.05	2.26	2.07	3.69
EAST SYSTEM	-.90	.56	1.42	1.19	1.13	-.62	2.95	2.13	1.88	4.10	2.77	4.01	1.73
ALL SYSTEMS	-.25	.87	2.60	1.26	1.98	.32	3.91	3.29	1.77	3.13	2.67	3.65	2.10
AREAS													
CENT.	-4.49	3.36	-8.67	-9.00	-8.59	.49	3.88	.93	-1.91	8.94	1.36	.91	-1.33
WEST.	-1.09	3.14	.41	.86	3.11	4.94	10.49	2.76	3.40	6.36	2.14	1.94	3.00
EAST.	-4.70	2.51	-12.01	-11.29	-5.57	-.25	.81	-4.85	-3.02	3.70	.67	-2.03	-3.19
GEORG.	-.59	7.27	-4.75	-3.73	-4.71	2.29	5.68	3.15	1.96	16.83	7.33	5.33	-2.90
N.E.	-6.28	1.94	-7.94	-6.82	-4.65	1.27	.59	.98	-2.06	4.37	-1.49	-5.44	-2.62
N.W.	-11.54	-12.78	-10.31	-7.61	-7.81	-7.01	-2.80	-7.37	-8.73	1.81	-8.53	-7.76	-7.99
EAST SYSTEM	-3.35	3.63	-6.79	-6.10	-3.82	1.89	4.77	.40	-1.14	7.71	1.99	.28	-.22
ALL SYSTEMS	-3.80	2.72	-6.98	-6.18	-4.04	1.40	4.38	.01	-.60	7.39	1.41	-.15	-.63
TOTAL													
CENT.	-2.85	1.55	-3.70	-1.23	-.19	6.98	8.67	.60	.14	3.42	1.48	.10	1.10
WEST.	-1.73	1.31	-1.37	.36	.53	6.15	7.80	.67	1.09	2.64	-1.24	-.60	1.21
EAST.	-2.28	1.75	-7.10	-5.69	-1.97	2.40	4.69	-.27	.87	3.76	1.66	-1.74	-.55
GEORG.	-.69	5.41	-3.29	-2.16	-2.96	3.38	6.37	4.63	2.27	12.17	5.37	3.22	2.64
N.E.	-3.74	.49	-4.04	-1.60	3.84	-.12	3.36	2.01	1.78	7.67	4.99	4.12	1.41
N.W.	-1.84	-1.21	2.11	-.03	2.34	2.87	4.88	4.32	.30	.09	-.47	-1.85	.85
EAST SYSTEM	-2.48	1.68	-3.71	-1.59	-.04	5.37	7.44	.83	.71	4.18	1.49	.27	1.01
ALL SYSTEMS	-2.45	1.53	-3.42	-1.51	.09	5.24	7.31	1.01	.69	3.95	1.39	.15	1.00

COMPARISON OF 1987 ACTUAL AND 1987 FORECAST OF CUSTOMERS LOADS

	DECEMBER PEAK-MW ACTUAL	FOR**	AVERAGE PEAK-MW ACTUAL	FOR**	ANNUAL ACTUAL	ENERGY-AV MW FOR**
MUNICIPAL						
CENTRAL	8660.7	8955.9	8283.1	8122.4	6065.6	5958.3
WESTERN	2386.0	2404.4	2274.4	2233.8	1611.6	1591.9
EASTERN	1777.9	1831.9	1515.8	1504.8	1068.9	1066.2
GEORGIAN BAY	580.3	591.3	485.5	480.5	338.0	330.2
NORTHEASTERN	372.8	382.4	289.9	290.1	205.4	206.6
NORTHWESTERN	283.6	319.2	239.2	246.4	169.0	171.3
SUBTOTAL	14061.3	14485.1	13087.9	12877.9	9458.5	9324.6
RETAIL						
CENTRAL	743.0	680.0	536.8	525.2	336.2	339.2
WESTERN	734.1	729.9	624.4	607.2	434.3	421.7
EASTERN	975.7	978.5	727.9	731.0	449.1	458.7
GEORGIAN BAY	762.9	697.5	548.7	535.8	341.1	332.1
NORTHEASTERN	507.2	534.4	403.3	407.5	261.9	268.9
NORTHWESTERN	188.8	191.4	145.0	154.2	94.5	102.7
SUBTOTAL	3911.7	3813.6	2986.2	2961.0	1917.2	1923.4
DIRECT						
CENTRAL	207.3	247.8	196.0	217.0	128.2	135.2
WESTERN	942.9	983.1	969.8	981.0	762.8	774.8
EASTERN	315.7	325.9	308.5	322.1	245.0	245.7
GEORGIAN BAY	104.7	102.0	99.2	97.3	79.8	76.2
NORTHEASTERN	989.3	922.1	921.1	894.2	747.9	722.8
NORTHWESTERN	534.8	531.8	541.8	528.0	469.4	452.7
SUBTOTAL	3094.8	3112.7	3036.4	3039.6	2433.0	2407.3
SYSTEM TOTAL	21067.8	21409.4	19110.4	18878.5	13808.8	13655.2
		21362.4		18897.0		13671.0

* EXCLUDES UNALLOCATED
** INCLUDES UNALLOCATED

FORECAST ERROR IN PERCENT FOR 1987 BASED ON THE 1987 FORECAST

	% ERROR=(ACTUAL-FORECAST)/FORECAST X 100			
	DECEMBER FOR*	PEAK FOR**	AVERAGE FOR*	ANNUAL ENERGY FOR**
MUNICIPAL				
CENTRAL	-3.3	-3.3	2.0	1.8
WESTERN	-2.8	-2.8	1.8	1.2
EASTERN	-2.9	-2.9	1.7	1.3
GEORGIAN BAY	-1.9	-1.9	1.0	2.3
NORTHEASTERN	-2.5	-2.5	-1.1	-1.6
NORTHWESTERN	-11.2	-11.2	-2.9	-1.4
SUBTOTAL	-2.9	-2.9	1.6	1.1
RETAIL				
CENTRAL	9.3	8.9	2.2	-1.9
WESTERN	-6.6	-6.6	2.8	3.0
EASTERN	-3.3	-3.3	-2.4	-2.1
GEORGIAN BAY	9.4	9.4	2.4	2.7
NORTHEASTERN	-5.1	-5.1	-1.0	-2.6
NORTHWESTERN	-1.3	-1.3	-6.0	-8.0
SUBTOTAL	2.6	2.6	.8	-1.3
DIRECT				
CENTRAL	-16.3	-6.9	-9.7	-5.2
WESTERN	-4.1	-1.7	-1.1	-1.5
EASTERN	-3.1	-3.1	-4.2	-3.3
GEORGIAN BAY	2.6	2.6	2.0	4.7
NORTHEASTERN	7.3	7.3	3.0	3.5
NORTHWESTERN	-6.6	-6.6	2.6	3.7
SUBTOTAL	-1.6	-1.4	1.2	1.1
SYSTEM TOTAL				
				1.0

* EXCLUDES UNALLOCATED
** INCLUDES UNALLOCATED

4.0 UNCERTAINTY IN THE LOAD FORECAST

Table A shows the forecast error made in the determination of the East System annual peak demand over the historical time period 1950-86. The forecast error is seen to be a convenient summary index of uncertainty in the load forecasts made for the future in the Corporation.

Forecast error may be caused by many factors. Some of these factors are: error in energy prices, economic growth, marketing efforts, government policy, and the rate and penetration of technological improvements. In addition to these unforeseen shifts in exogenous variables, errors also reflect differing methodologies used in preparing the forecast. By looking at the errors in Table A we attempt to quantify an uncertainty band around our forecast.

The forecast error $e_{t,k}$ is defined as the relative difference between a forecast made in year t for a year k time periods ahead ($f_{t,k}$) and the actual demand in year $t+k$ (a_{t+k})

$$e_{t,k} = (f_{t,k} - a_{t+k}) / a_{t+k}$$

The forecast error $e_{t,k}$ has two attributes: 1) it is always greater than or equal to -1 and 2) empirically it has been found to exhibit an underlying exponential behaviour. It is appropriate, therefore, to study the transformed variable $X_{t,k}$ given by

$$X_{t,k} = \ln(1 + e_{t,k})$$

The transformed variable $X_{t,k}$ is characterized by a normal distribution about the value 0 with a variance σ^2 .

The variance σ^2 is given by the following formula

$$\text{var}(X_{t,k}) = \sigma^2 = E[X_{t,k} - E(X_{t,k})]^2 = \frac{n}{\sum_{t=1}^n} x_{t,k}^2 / n$$

Where $E[\]$ = expectation value

$$x_{t,k} = X_{t,k} - \bar{X}_{t,k} \text{ where } \bar{X}_{t,k} \text{ is the sample mean of the population.}$$

n = number of observations of k year-ahead forecast errors.

Letting S_k^2 represent the variance estimated for a given population sample, it is assumed that $X_{t,1}$ has a mean growth rate g and a variance S_1^2 . Therefore,

$$X_{t,1} = g + u$$

$$X_{t,k} = kg + u'$$

where $u \sim N(0, S_1^2)$ (normal distribution)

where $u' \sim N(0, kS_1^2)$ (normal distribution)

The k year-ahead variance for $X_{t,k}$ (S_k^2) is given by kS_1^2 .

If the variance of $X_{t,k}$ were to show no growth then $S_k/\sqrt{k}$ would be a measure of the square root of the "within trend" mean squared error as well as the square root of the total mean squared error. However, the variance does exhibit growth and the following linear regression is used to explain this behaviour.

$$s_k / \sqrt{k} = \alpha + \beta K$$

The uncertainty limits around the forecast for k years ahead are generated by the above equation and the following formula:

$$\text{limits} = F_t \exp [\pm Z_{\alpha/2} * S_t]$$

$$\text{Pr} \left[F_t \exp (Z_{\alpha/2} * S_t) \leq F_t \leq F_t \exp (-Z_{\alpha/2} * S_t) \right] = 1 - \alpha$$

where, F_t = forecast for period t

$Z_{\alpha/2}$ = normal deviate at the $\alpha/2$ probability

Pr = probability

The distribution of the uncertainty bounds has a log-normal shape. There is therefore no possibility of negative values being encompassed by the uncertainty limits.

TABLE A

FORECAST ERROR (%)*
EAST SYSTEM DECEMBER PEAK

Year Forecast Made	Years After Forecast									
	1	2	3	4	5	6	7	8	9	10
1950	-5.6	-11.1	-14.7	-16.6	-18.1	-25.4				
1951	1.1	0.1	-0.4	-1.5	-9.3					
1952	2.2	5.0	6.1	-2.0	-4.1					
1953	2.3	4.0	-2.5	-3.9	-4.1	-6.6				
1954	-0.4	-5.2	-6.0	-5.2	-7.4					
1955	-3.0	-2.5	-1.5	-3.2	-6.7	-5.3				
1956	1.6	5.7	4.8	2.0	3.7	5.2				
1957	2.8	1.5	-0.9	3.4	6.3	6.6	6.2	6.7		
1958	-0.9	-2.2	2.1	4.1	3.8	1.4	1.4	-1.8	-4.7	-3.4
1959	0.1	2.8	6.1	6.4	4.1	4.5	0.6	-2.9	-2.0	-7.4
1960	2.6	5.3	6.0	3.2	3.6	0.4	-2.9	-1.6	-6.6	-6.2
1961	1.9	3.2	0.8	0.6	-3.0	-5.4	-3.7	-8.3	-7.8	-8.5
1962	1.0	-1.9	-1.6	-4.8	-7.5	-6.6	-10.6	-10.1	-10.7	-7.1
1963	-2.7	-2.3	-6.0	-8.6	-7.1	-11.6	-10.8	-11.3	-7.5	-10.7
1964	-1.6	-4.4	-6.5	-5.3	-9.4	-8.7	-9.4	-6.4	-4.4	-5.1
1965	-1.2	-3.7	-1.5	-5.9	-5.2	-5.8	-1.7	-5.1	-5.6	0.0
1966	-1.0	0.2	-5.9	-4.2	-4.8	-0.6	-4.0	-4.4	1.7	0.1
1967	1.2	-3.1	-2.0	-2.2	2.4	-0.8	-1.0	5.5	4.2	3.3
1968	-0.3	1.7	1.7	7.0	3.2	2.7	9.5	8.2	7.3	16.5
1969	0.9	1.9	7.0	5.2	5.6	13.0	11.3	10.3	19.8	27.4
1970	1.0	6.7	5.7	5.5	12.0	10.9	9.8	19.2	26.8	30.5
1971	6.2	3.4	3.6	10.1	9.0	8.0	17.3	24.8	28.4	33.1
1972	1.9	2.0	8.6	7.2	6.0	15.0	22.3	25.9	30.4	41.5
1973	0.4	7.9	7.5	6.5	15.6	22.9	26.5	31.1	42.2	50.0
1974	6.3	6.3	7.0	17.4	26.0	29.7	34.4	45.8	53.9	47.5
1975	1.1	1.8	12.2	21.0	24.3	28.4	39.2	46.7	40.5	56.3
1976	-1.9	8.0	15.9	19.0	23.0	33.0	40.0	34.0	48.9	40.2
1977	5.8	13.0	15.6	19.6	29.4	35.9	29.4	43.2	34.3	41.9
1978	4.7	6.0	8.4	16.0	20.7	14.1	25.2	16.5	21.9	29.3
1979	1.4	1.2	6.7	10.7	4.4	14.4	5.9	10.3	16.4	12.7
1980	1.2	6.8	10.7	4.0	12.2	2.5	5.3	9.8	5.0	5.9
1981	3.4	5.1	-2.5	5.0	-3.9	-1.2	3.0	-1.4	-0.4	0.7
1982	4.8	-2.9	4.8	-4.4	-1.8	2.2	-2.5	-1.9	-1.2	-0.1
1983	-6.3	1.5	-7.5	-5.2	-2.0	-7.1	-7.4	-7.7	-8.0	-8.2
1984	4.8	-4.5	-3.0	0.4	-4.7	-4.7	-5.2	-4.3	-3.6	-3.2
1985	-5.2	-3.8	-0.6	-5.8	-6.1	-5.9	-5.5	-4.8	-3.9	-3.1
1986	0.8	4.5	-0.4	-1.0	-1.2	-1.1	-1.5	-2.1	-2.5	-2.4
1987**	4.7	-	-	-	-	-	-	-	-	-

* Difference between forecast made 1 to 10 years prior to year indicated divided by actual. A negative sign indicates forecast is too low.

**Figures in bold are predicted errors of previous forecast assuming actual = 871214. Positive figures indicate the percentage deviation of previous forecasts from the 1987 forecast.

5.0 GLOSSARY

5.1 Demand (Versus Load)

Demand means the electrical output from the Corporation's generating resources together with outside purchases required to supply the load of the Corporation's customers. In this report demand refers to the level of demand at the generating stations, while load refers to the flow of electricity at the wholesale billing points. Each term refers to peak or energy as specified in context.

Power means an instantaneous time rate of delivery of energy. Peak refers to the power averaged over a short period during which time the load is at its maximum. Energy demand is the accumulation of power over time, which results in an amount of useful work (or heat, lighting etc.)

In this report energy is reported in units of terawatt-hours or else in average megawatts. To obtain average megawatts for a period of time, the megawatt-hour figure is divided by the number of hours in the period.

Annual and Winter Peak Demand

All peak demands shown in this report incorporate the effects of typical weather conditions associated with the monthly peak demands. Under these conditions the annual peak demand occurs in December and the winter peak normally occurs in January.

Primary Peak Demand

Primary Peak Demand is the total generated and purchased minus secondary sales.

Secondary sales is power provided at the convenience of Ontario Hydro on a non-contractual basis usually to interconnected utilities. This element is not forecast in this report.

Primary Demand in Terms of Generation

Primary Peak Demand is the sum of the customers' peak requirements (not necessarily coincident with the system peak) adjusted by an allowance for diversity and losses. This figure gives the primary peak demand at the level of the generating stations.

-Peak - The figures shown are those for the time of the maximum 1-hour or 20-minute peak demand.

An allowance for the weather effect expected on the typical monthly peak day is incorporated into the Primary Peak Demand for each month. Diversity and losses are affected by extreme weather as well.

-Energy - Monthly energy demands shown in this report are expressed in terawatt hours and average megawatts, in order to give an immediate impression of load factor, and also to make successive monthly values independent of differences arising solely from the varying lengths of the months.

Ontario Primary Demands in Terms of Generation

East System

Includes:

The primary power and energy loads of Municipalities, Industrial Customers, and Retail Customers in Ontario within the geographic boundaries of the Central, Western, Eastern, Georgian Bay and Northeastern Regions, together with appropriate diversity and losses.

Power and energy delivered free of charge by Ontario Hydro to Spruce Falls Power and Paper Company Limited in compensation for the effects of Little Long Generating Station on the Company's Smoky Falls Generating Station.

Excludes:

Power and energy exported to the United States and the Province of Quebec. Also excluded are deliveries under exchange agreements, namely, to Fort Erie on behalf of the CNP Company, and to Cornwall on behalf of the St. Lawrence Power Company. In both of these cases the amount of power delivered is made up at another point on the system so that there is no resultant demand on the Corporation's resources.

The loads of retail customers in Hornepayne, although customers of the Northeastern Region, because they are supplied from power resources within the Northwestern Region.

West System

Includes:

The primary power and energy loads of Municipalities, Direct and Retail Customers in Ontario within the geographic boundaries of the Northwestern Region, and the loads of retail customers in Hornepayne together with appropriate diversity and losses. The latter customers are included because they are supplied from resources within the Northwestern Region.

Power and energy delivered free of charge to Boise Cascade Company (Kenora), as compensation for the effects of Whitedog Falls Generating Station on the output of its generating stations.

Excludes:

Power and energy exported by Ontario Hydro to the United States and the Province of Manitoba.

Power and energy delivered to Boise Cascade at Fort Frances in exchange for the output of the Company's Calm Lake and Sturgeon Falls Generating Stations.

Ontario primary demands (both East and West Systems) exclude the delivery of turbo replacement power to various paper companies.

5.1.1 Basic Load Forecast

The Basic Load Forecast shows what will happen to electricity demand if Ontario Hydro does not adopt new activities to affect electricity demand. However, the current Demand/Supply Options Study indicates some future electricity needs of the province may be met by other means than by increasing supply. Ontario Hydro could promote changes in the pattern of usage to allow some of the province's future electricity needs to be met by demand reductions.

5.1.2 Primary Load Forecast

The Primary Load Forecast takes into account the effect on Ontario Hydro demand of future Ontario Hydro activities designed to affect the level and shape of the load. It is derived by subtracting from the Basic Load Forecast the net effect of Ontario Hydro incentive programs:

- (1) changes in rate structure such as time-of-use, off-peak incentives, etc;
- (2) financial incentives such as grants or loans, etc.

These programs are called Ontario Hydro Indirect Incentives. It is the Primary Load Forecast which is to be used for supply planning purposes.

5.2 Diversity and Losses

Diversity is the difference between the sum of (individually metered) customer loads at the time of system peak and the arithmetic sum of the peak loads of all the customers regardless of whether they coincide with the system peak or not. Since individual customers experience their peak loads at diverse times, the arithmetic sum of their peak loads will be greater than the sum of customer loads at the time of system peak, and therefore the value for diversity is always negative.

Losses are the sum of electrical losses and consumption incurred in transmitting the electricity from the generating stations' terminals to all the customer metering points. This is evaluated by taking the difference between customer loads and system demands measured at the generating stations.

The figure for diversity and losses together will be positive if losses exceed diversity, and negative when diversity exceeds losses.

Diversity is a function of the timing of end-use utilization which is affected by social patterns and weather conditions. Losses are due mainly to transmission line loadings determined by system configuration and operation. System operation depends on hydraulic generation resources, export and circulating power flow, outages, etc.

There is no diversity in energy demand. The difference between the primary energy and the energy delivered to customers is losses.

5.3 Customers' Loads

Customers' Loads are the maximum peak loads of system customers which include cost contract municipalities, industrial customers and retail customers. Estimates of these loads are provided by the Regional Marketing Managers. The totals of these non-coincident customers' loads are referred to as the sums of

customers' loads with appropriate qualifications for regional and other classifications.

The forecasts of Area loads in this report conform to the Power Billing Department, Customer Service Division practice of obtaining Area loads by summing the non-coincident loads of the D.S.'s supplying it.

5.3.1 Firm Loads

Firm Loads are supplied as required by the customer at all times as far as physical conditions permit.

5.3.2 Capacity Interruptible Loads

In general, capacity interruptible loads are those which can be interrupted under contract provisions which exchange interruptibility for the lower rates. Capacity interruptible power is the only class available. This class of power is available only for loads which can be reduced by at least 5,000 KW during interruption periods.

The sum of interruption periods shall not exceed the following:

- (1) In any month up to 15% of the total time in the month.
- (2) In any year up to 10% of the total time in the year.
- (3) In any 5 consecutive years up to 5% of the total time in the 5 year period.

The purpose of supplying this class of power is to enable Ontario Hydro to reduce the generation reserves it would otherwise provide for, and to serve as a means of system relief under emergency conditions and other unpredictable circumstances.

Interruption Periods - (applicable Monday to Friday inclusive)

March to November inclusive - up to 5 hours per day
December, January and February - up to 14 hours per day

The customers' loads in this report are composed of the total firm and capacity interruptible. Therefore, in this report, the demands shown assume that rights of interruption under Capacity contracts are not exercised.

The amounts of power under contract within this class can therefore be regarded as being served out of reserve capacity planned for other purposes. No capacity is planned to meet interruptible loads.

As can be seen from the table under 1.2.4, 78 MW of capacity interruptible contracts are forecast to be added in the period of 1985-90. Due to the changing shape of the system duration curve and to diversity among these customers, the task of translating non-coincident interruptible loads into the potential capacity savings from primary load cuts requires that allowance be made for diminishing effectiveness of successive increments of interruptible contract.

5.4 Standby Power

The Corporation has undertaken to supply standby power to the following customers who have their own generation.

<u>Standby Amount</u>		
Boise Cascade - Kenora	10.5	MW
Boise Cascade - Fort Frances	8.0	MW
Eddy Forest Industries Ltd	7.5	MW
Gananoque Electric Light & Water	1.25	MW
Great Lakes Forest Products (44 kV)	6.0	MW
Great Lakes Forest Products	17.1	MW
MacMillan Bloedel	1.8	MW

No specific allowance has been made for increases in the customers' load or system demands from standby requirements of customers.